The Future Of Computer Games: Software That Thinks For Itself

COMPUTE!'s GAZETTE

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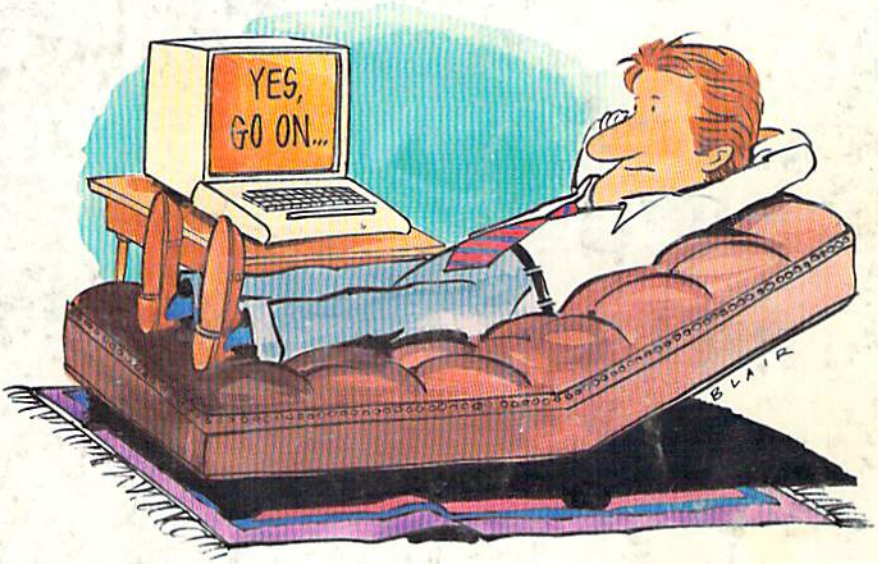
June 1984
Issue 12 Vol. 2, No. 6
02220 £1.95 UK $3.25 Canada

For Owners And Users Of **Commodore VIC-20**™ And **64**™ Personal Computers

The Frantic Fisherman

Battle the darting sharks and stay out of the rain in this lively action game for the VIC and 64.



Therapy

What kind of counselor is your computer? "Therapy" might surprise you.

Castle Dungeon

Defuse the ticking time bombs and avoid the guardian monsters in this dark dungeon maze. A challenging all-graphics adventure game for the VIC and 64.

Also In This Issue:

The Beginner's Corner
Machine Language For Beginners
Home Telecommunications

Power BASIC: One-Touch Keywords

Fingertip control of 52 BASIC keywords. For the VIC and 64.

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Dear Susan,

I've discovered something very exciting that I want to share with you. I've always thought assembly language was too complicated for me to learn and I've been doing all my programming in Basic, or buying software that doesn't do quite what I want. You know, Basic is just too slow for a lot of tasks, and I can't find ready made software to do those specialized things I want to do.

Well, I just bought Panther's C64 Assembler and I found out that assembly language is easier than I thought, and it's also fun.

The C64 Assembler is very "friendly" and the documentation is clear and well written. One very nice feature of the manual is a section for the neophyte assembly language programmer that really helped me understand how to use the machine.

Now I'll be able to write those programs myself instead of waiting for some software manufacturer to guess what I'm looking for! My programs will do exactly what I want, and I'll have fun writing them.

The dealer even told me that Panther is looking for good programs in assembly language, and they're willing to publish and pay royalties for useful programs which meet their standards.

As you know, I don't have any experience yet, so I can't compare assemblers, but Jim's seen it and he's a professional assembly language programmer. He says it's the easiest-to-use and the fastest assembler he's seen for any microcomputer. In fact, he said he's going to buy a Commodore 64 just so he can use it.

Come on over to my place when you have time and I'll show off the assembler for you, or go to the dealer down the street to see it. The whole Commodore community is excited about the C64 Assembler.

I've got to sign off now. I'm anxious to get back to my assembler and finish the program I'm working on. This is fun!

Let's get together soon.

Bob

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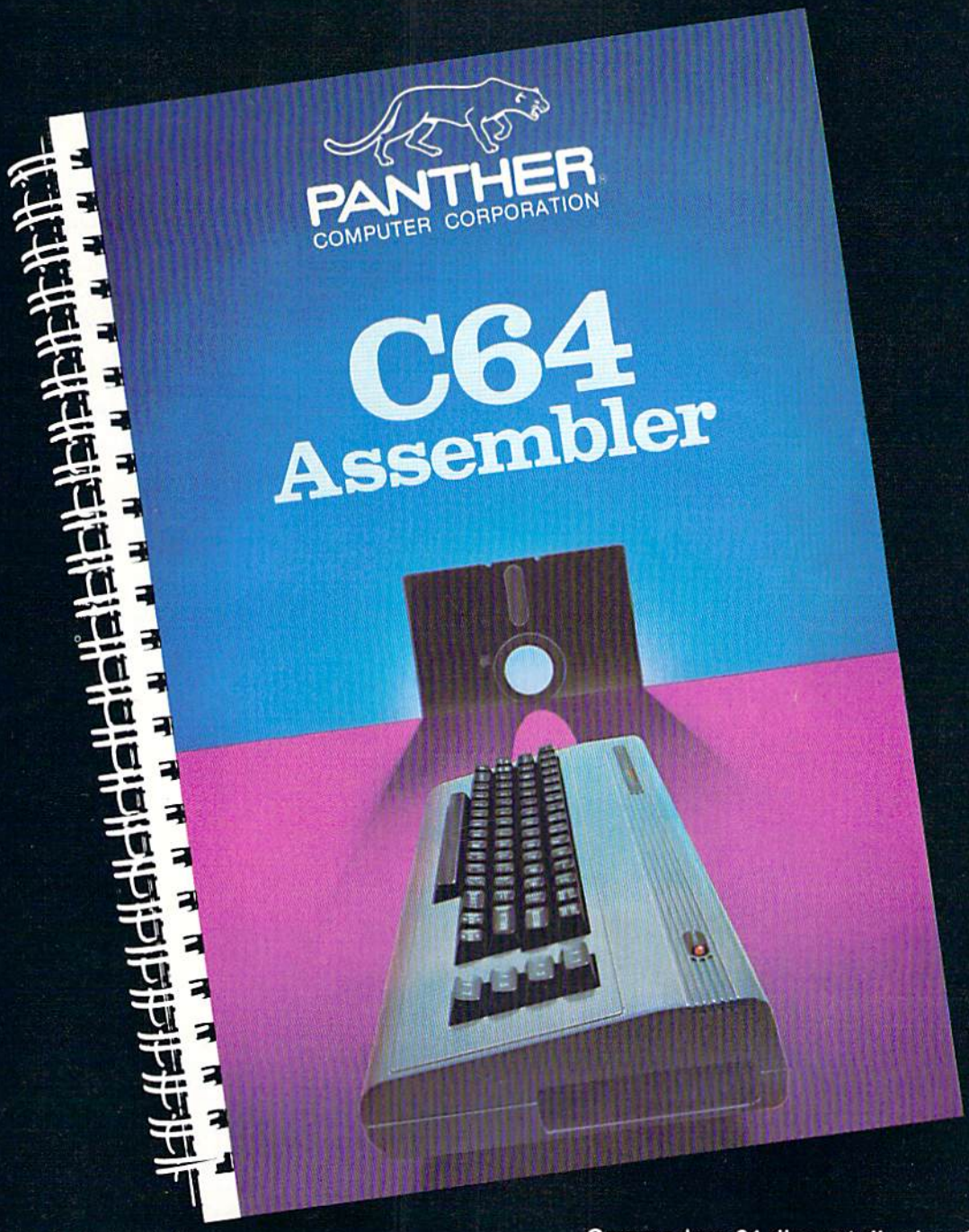
The Assembler for the Commodore 64.



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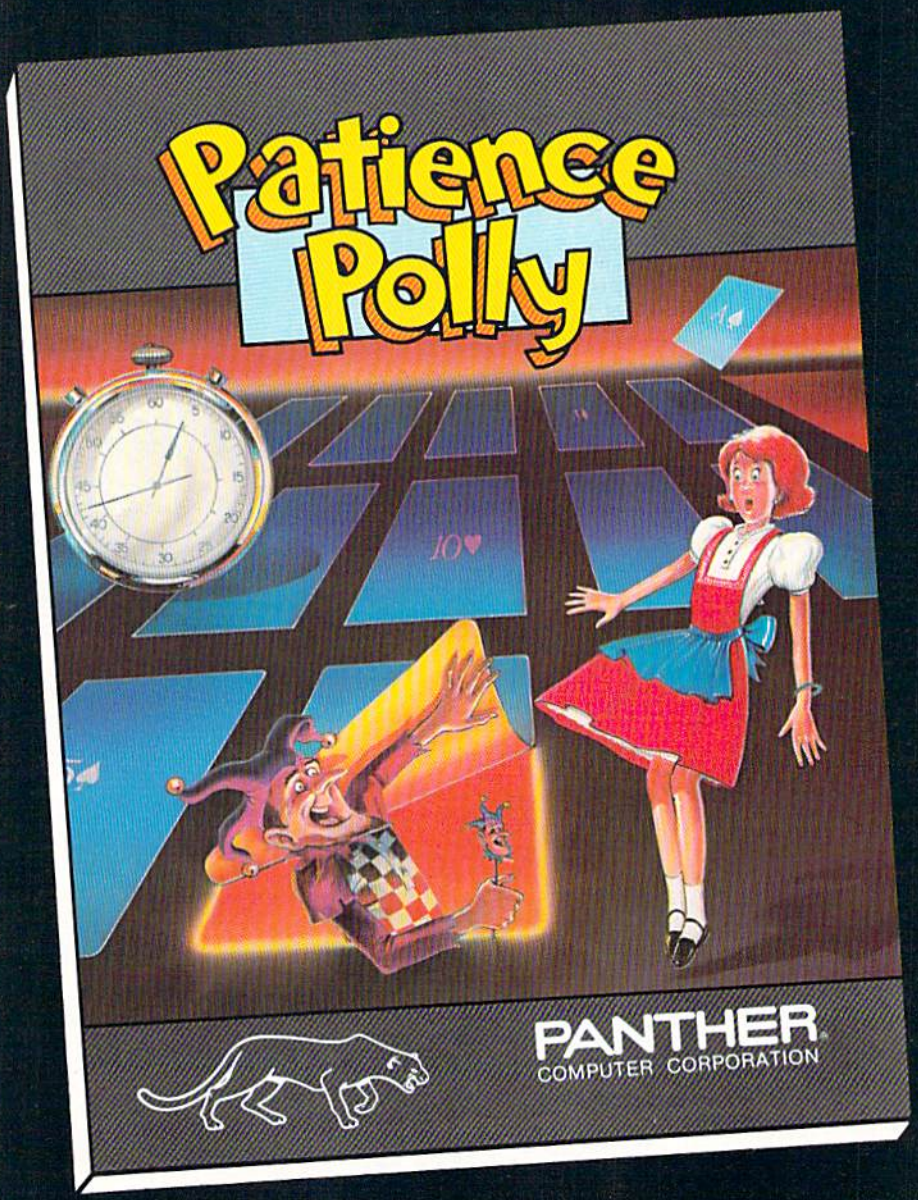

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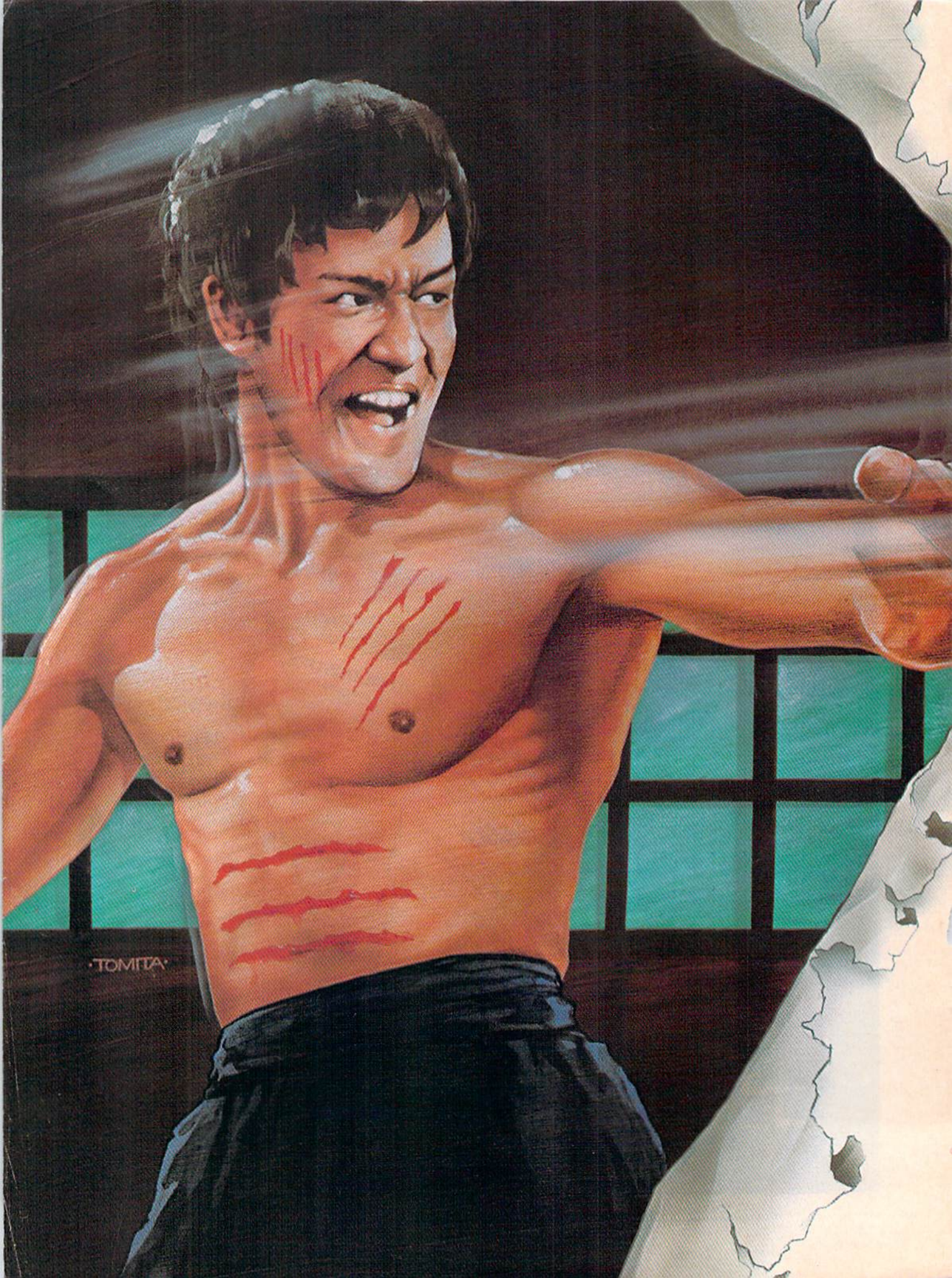
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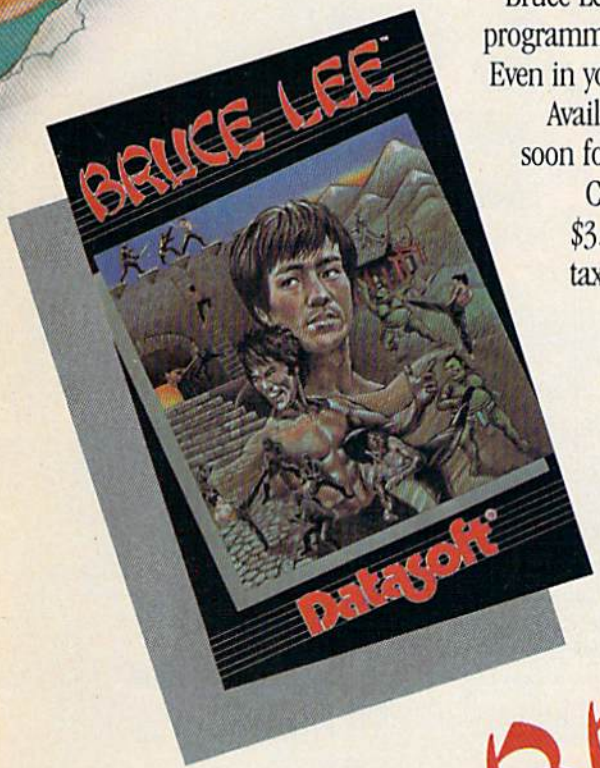

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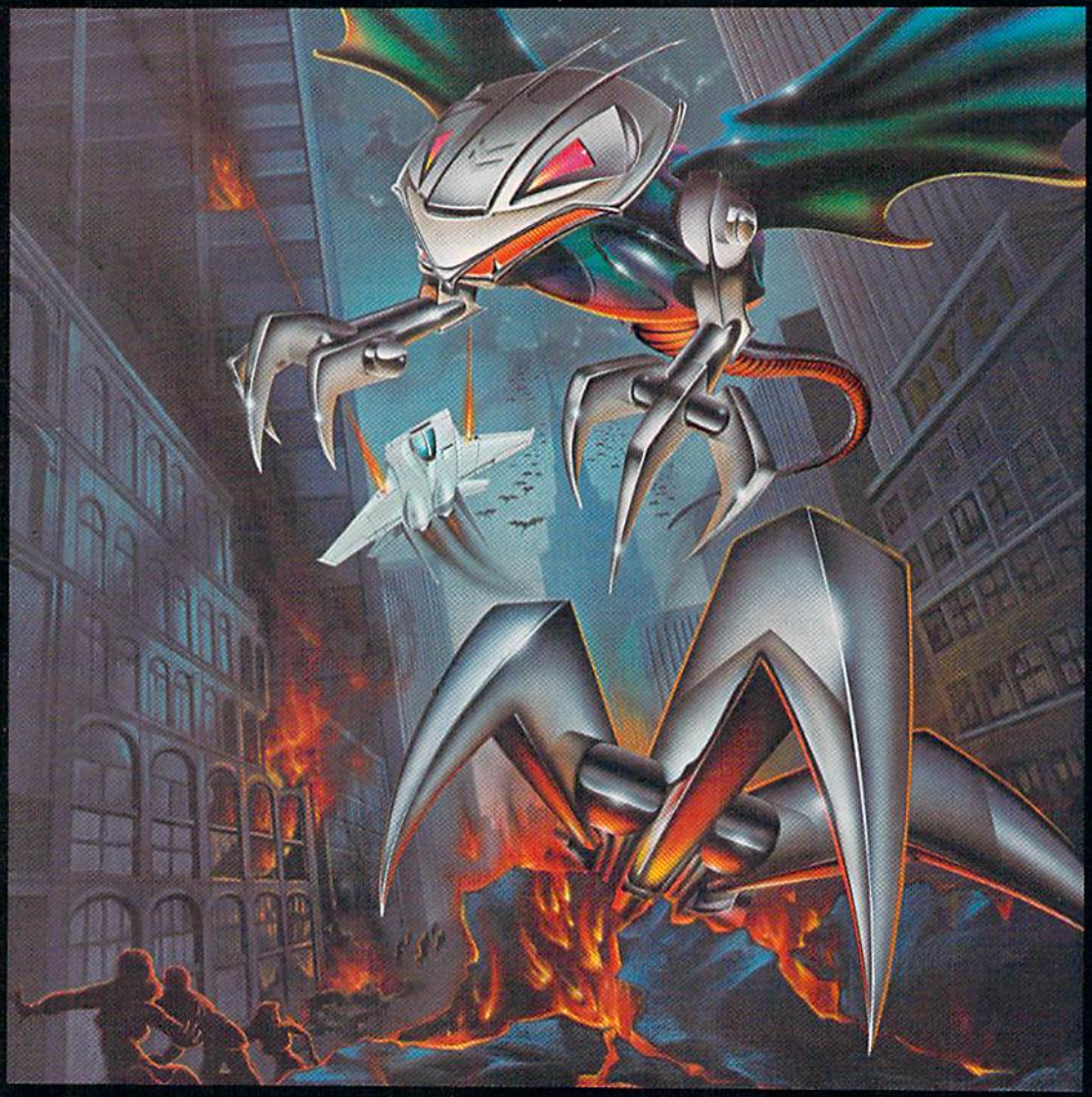
Save New York!™



It was as peaceful a day as New York ever gets, when suddenly the sky went dark and a monstrous droning noise filled the air. Hordes of grotesque aliens were swooping down from all sides, biting into the Big Apple as if they hadn't eaten for days. They were laying eggs, too. Horrible slimy things that got down into the subway tunnels and began clawing their way up. If anyone was going to save the city, it would have to be me. I leapt into my rocket and began blasting away. I thought I stood a fighting chance, but fuel's running low... another wave of invaders on the horizon... signing off...

SAVE NEW YORK.™ For the Commodore 64.

CREATIVE SOFTWARE

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June 1984 Vol. 2, No. 6

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THE EDITOR'S *notes*

A Word of Thanks to you readers and authors ... with this issue the GAZETTE is 12 issues old, and is one of the most phenomenal growth stories in the consumer publications industry. We've achieved a paid circulation in excess of 300,000, making the GAZETTE one of the half-dozen largest magazines in the entire industry. Our parent publication COMPUTE! was the fastest growing computer magazine in the Audit Bureau of Circulation numbers comparing the six months ending December 1982 with the six months ending December 1983. The next closest competitor grew by 106 percent compared with COMPUTE!'s 247+ percent. Looks like next year, we'll have two of our own publications competing with each other. Now that's a nice problem to have.

Our newly launched GAZETTE DISK is doing nicely too, thanks to you; we appreciate your continued support. You'll notice the disk is still unprotected. While we've touched on this issue in recent editorials, this time we're starting your additional feedback. The letter that follows is representative of many of the letters we've received on the topic of protection:

Dear Mr. Lock:

I read your April 1984 editorial with great interest. As a retailer in software, I believe the presence of copy-protected software directly effects the saleability of my stock. Customers tend to shy away from heavily protected software. They feel (and rightly so) that once they lay their money down, they should be able to make backup copies should disaster strike their original. (Or more commonly, make and use backups and keep their original in a safe place.) Various service schemes by software makers who have backup-restricted products don't appease the customers much. If a disk crashes, why should they have to wait a few weeks for a new copy to arrive in the mail?

In trying to answer the question of whether or not to protect, we should first address the question of why people steal software. Here, we begin to deal with motives and human nature. For the software pirate, the motive is greed. A low overhead means high profits. For this kind of person, there is no viable software-protect remedy. No matter how sophisticated the software-protect features are, ways can be found to defeat them. Also, development costs of these features are tacked on to the cost of the software, thereby raising customer prices. The higher the price of software, the more likely people will find a way to pirate. The disparity between true value and customer cost gives the pirate room to operate. Carried to the extreme, one can think that the development cost of software-protect features exceeds the cost of the product it's protecting. Would you be willing to pay the premium on a homeowner's insurance policy if it exceeded the cost of the house?

Another motivation for software piracy, less malign, is software copied and given in the spirit of friendship. A user group operates to raise the computer literacy of its members. One of the finer things in life is our ability to learn, and learning about a subject we're interested in satisfies a need. On the other hand, teaching what we know gives us a better feeling about ourselves. Successful teachers can tell you firsthand how great the ego feels after a class. When teachers and learners combine as they do in a user group, it's magic. When the teacher gives something to the learner that doesn't cost anything, as in copied software, this magic reaches higher plateaus. Sharing can never be overrated when it comes to building friendships.

We all like extending favors that cost us nothing. However, when others pay the cost, the favor becomes less than altruistic. Here again, with the abundant availability of backup protection-override software, high cost software with backup protection is readily defeated. Nothing is gained by the software seller. I feel that by and large, people are basically good. Any businessman has to have this attitude if he is to succeed. In areas of commerce, distrust only slows things up and ends in costing both parties much in the long run. The only thing needed is a little caution, not total distrust.

In matters concerning professional software pirates, there is legal recourse. Though irritating, I think their impact is small. By giving them more motivation (high software costs) to steal, software houses who use copy protection only hurt themselves. I also feel that software pirated for reasons of friendship would be less prevalent at lower costs. People would be more likely to expand their libraries with money out of their own pockets. Also, a little public education concerning copyright laws would go a long way.

In closing, I feel that you would do better serving the public and yourselves by offering quality products at the lowest possible cost. You've indicated that you're opposed to excessive software copy protection. The fact that you allow a software company that sells a backup override program (Microware) to advertise in your magazine seems to support this. If you are soliciting votes, then I vote that you keep your software inexpensive and backup unlimited.

By the way, keep up your high magazine standards. It must do *your* egos good knowing you're doing such a great teaching job.

Sincerely yours,
Ron Bosse

Until next issue, enjoy your GAZETTE.

Robert Lock

Editor In Chief

London Blitz

The streets of London are threatened with deadly V-1 rockets. You, as a member of Her Majesty's Royal Bomb Squad, must disarm each one before its timed fuse detonates. A variety of bombs with infinite defusing combinations make for endless nail-biting excitement.

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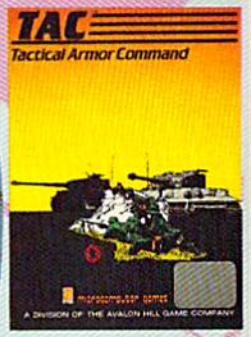

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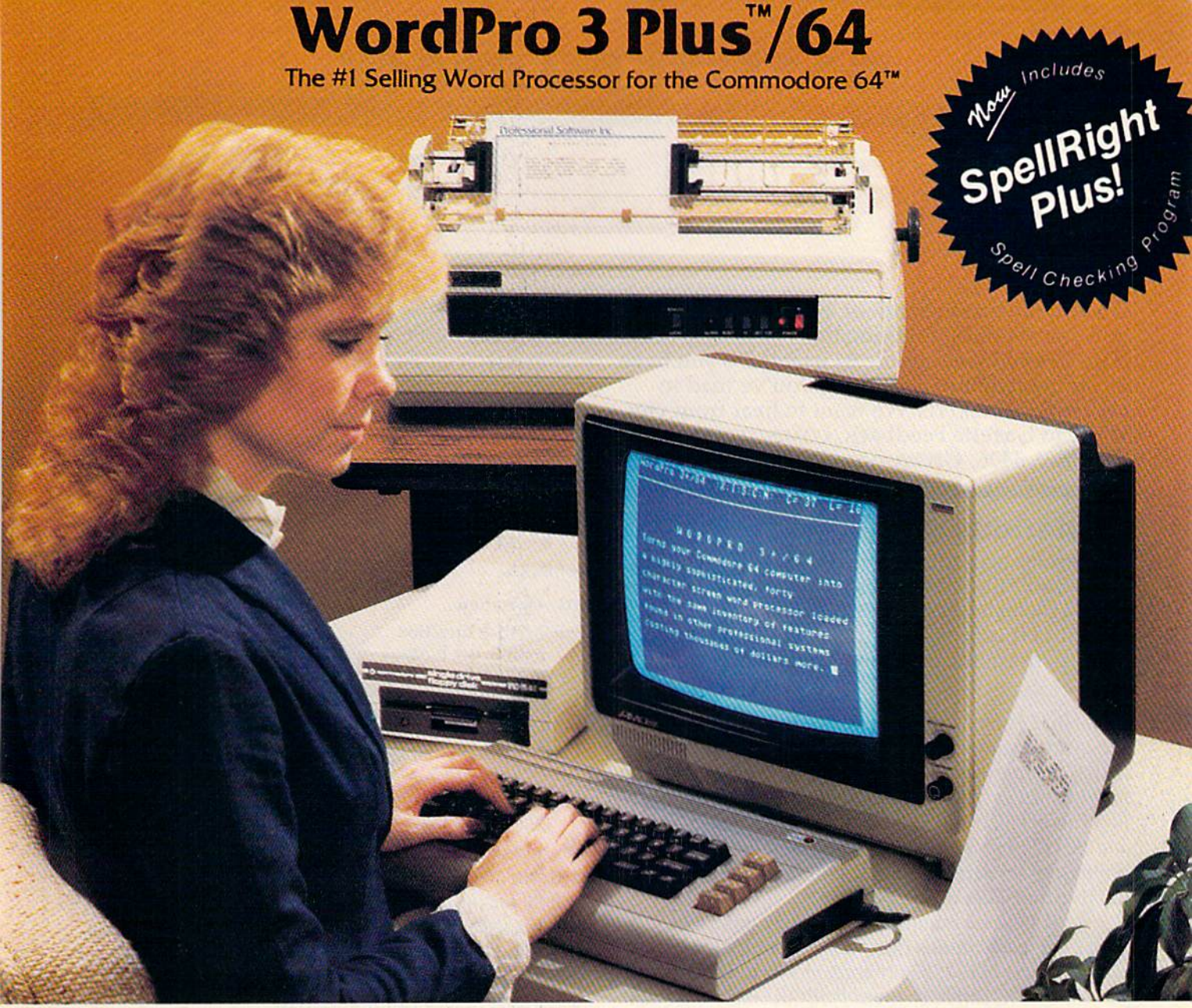

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GAZETTE FEEDBACK

EDITORS AND READERS

Do you have a question or a problem? Have you discovered something that could help other VIC-20 and Commodore 64 users? Do you have a comment about something you've read in COMPUTE!'s GAZETTE? We want to hear from you. Write to Gazette Feedback, COMPUTE!'s GAZETTE, P.O. Box 5406, Greensboro, NC 27403.

Mysterious Numbers

I'm curious about lines like: SYS 12*4096+12*256 and BB=PEEK(44)+27 in your magazine. Why don't you just write: SYS 52224 or BB=35? Wouldn't this be quicker than having the computer perform the mathematical functions first?

Joel A. Brondes

In the first example, you're right. It would have been easier (and quicker) to simply write SYS 52224. The reason the line was written with the formula was simply programmer preference. He might have been thinking in terms of blocks (4096) and pages (256) of memory, and this computation method was easier for him than computing the actual SYS address. In hexadecimal the number translates to $CC00.

In the second example, the BB=35 statement might not work. In this case, memory location 44 indicates the start of BASIC program memory. But the start of BASIC can be changed by POKEing values into byte 44. In this case, if the start of BASIC were changed, the value in BB would also change.

PEEKing Joysticks On The 64

I am a VIC-20 owner and am considering switching to the Commodore 64. I went to a store to compare the two, and found that the 64 had two joystick control ports. Can two joysticks be plugged in, or just one and a light pen? If two can be plugged in, does a program read both ports or just port 1? If it reads them both, then two players can play at the same time, but how does this work?

Todd Wolfe

Yes, joysticks can be used in both ports. You can check the joystick positions by PEEKing two memory locations. Each time you push the joystick in one direction or press the fire button, various values are placed in these locations. The values indicate which operation was performed with the joystick, paddles, or light pen. The location to PEEK for port 2 is 56320, and port 1 is 56321. Plug a couple of joysticks into ports 1 and 2 and run this short BASIC program. While the program is running, push the joystick and firebutton and watch the values in these memory locations change.

```
10 A=56320:B=56321
20 PRINTA;PEEK(A),B;PEEK(B):GOTO20
```

Each operation performed on the joystick sets a bit (a byte is composed of eight bits) in the memory locations. The normal bit values are one, but when joystick activity is detected, the bit is set to zero. The bits are arranged as follows:

Bits	Operation
3–0	joystick direction
3–2	paddle fire buttons
4	joystick fire button
7–6	read paddles on port 1 or 2

Reading individual bits is done by PEEKing with an AND. To PEEK bit 0, you would AND with 1; to check bit 1, AND with 2; the number used for the AND doubles with each succeeding bit, up to a value of 128 for bit 7

Here's another short demo program. Run this program with a joystick plugged into port 2. Run it a few times, changing the value of B to 1,2,4,8, and 16 to see how the individual bits are detected. When you push the joystick, the corresponding bit will change to a zero, and the zero will be displayed on the screen.

```
10 A=56320:B=1
20 PRINTPEEK(A)ANDB:GOTO20
```

As for a program being able to read both joysticks at the same time, it's up to the programmer. There are many two-player games available. Some game programs might use both the joystick ports plus the keyboard. It depends on the individual application.

Double-Sided Floppies

I have a tip for your readers and a question for you. Some programmers like to cut a new write notch on their single-sided diskettes so they can use the reverse side. However, there's no need to spend your money on a special tool to cut the notches. As long as you measure accurately, a half-circle cut with an ordinary paper punch will suffice.

Now my question: Since I have been using the backs of my floppy disks for additional storage, I have come across a most annoying problem.

About ten percent will fail to format correctly, and will give me the message:

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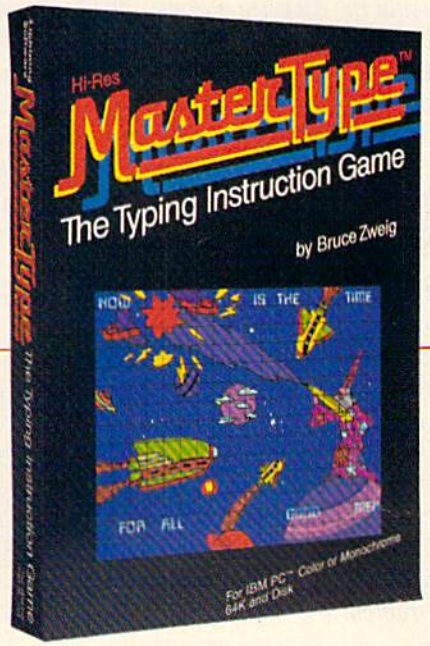

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21, READ ERROR, 75, 01

This never happens when formatting the front side of the disk. What is the problem?

Philip A. Grimes

Thanks for the tip. However, here's a strong caution which is also an answer to your formatting problem.

When most diskettes are first manufactured, they are intended to be double-sided. The magnetic coating on both sides is subjected to rigorous tests. If both sides pass the certification tests, it is sold as a double-sided diskette. If one side fails, but the other tests OK, it is sold as a single-sided disk. When you use the reverse side of a single-sided floppy, it may have already been tested and proven to be faulty—thus a probable cause of your formatting problem.

Another strong point to consider when using the reverse side: dust contamination. Manufacturers put a special lining inside the diskette jackets. The lining acts like a broom, sweeping the dust off the magnetic surface. Because the diskette always spins in the same direction, the dust has a tendency to be swept into one corner of the jacket. When you turn the diskette over and use the reverse side, the diskette spins in the opposite direction. This can spin the dust out of the corner, and back onto the delicate magnetic coating, possibly causing irreparable damage.

Using commercially available double-sided disks doesn't necessarily solve the problem. Double-sided diskettes are meant to be used on double-sided disk drives. These drives have two read/write heads, one on the top and one on the bottom. This means that the diskettes don't have to be turned over; they always spin in just one direction. When you use double-sided floppies in the 1541 and 1540, you still have to reverse the diskette to reach the second side. So even though the diskette was tested safe on both sides, you still face the dust contamination problem.

GAZETTE Double-Talk?

I'm an avid reader of your magazine, but your March issue leaves me puzzled.

In the Feedback column you reiterate advice to avoid using the *SAVE@0:* (SAVE with replace) command with the 1541 disk drives. Yet, you feature a utility on page 120 which is based on just that function.

What gives? As they say, it appears that you're talking out of both sides of your mouth.

John Premack

An interesting point. We still maintain that you should avoid the SAVE with replace command to be on the safe side.

However, in our judgment, the article and program were worth publication on their own merit. The author chose to use this command in his program. It is possible to remove the "@0:" (SAVE-with-replace) from the program, but you would have to change the program each time.

Cleaning Disk Drive Heads

I recently purchased a head cleaning kit for my Commodore 1541 disk drive. The instructions included with the cleaning kit state that I must insert the cleaning disk into the drive and then start the drive to engage the head for 30 to 60 seconds. Does the head engage when you first turn on the drive (the red light turns on for about 5 seconds). How do I engage the heads so that the disk drive is properly cleaned?

Jerry A. Coy

Don't depend on the brief spin when the drive is first turned on to do the cleaning. After inserting the cleaning diskette, you can make the drive spin any number of different ways.

Try loading the directory (LOAD "$",8), initializing the diskette (OPEN 15,8,15,"I"), or using the format command (OPEN 15,8,15:PRINT#15,"NO: TEXT,T1":CLOSE 15). Any command that forces the drive to either read or write can be used when cleaning.

Colliding Sprites

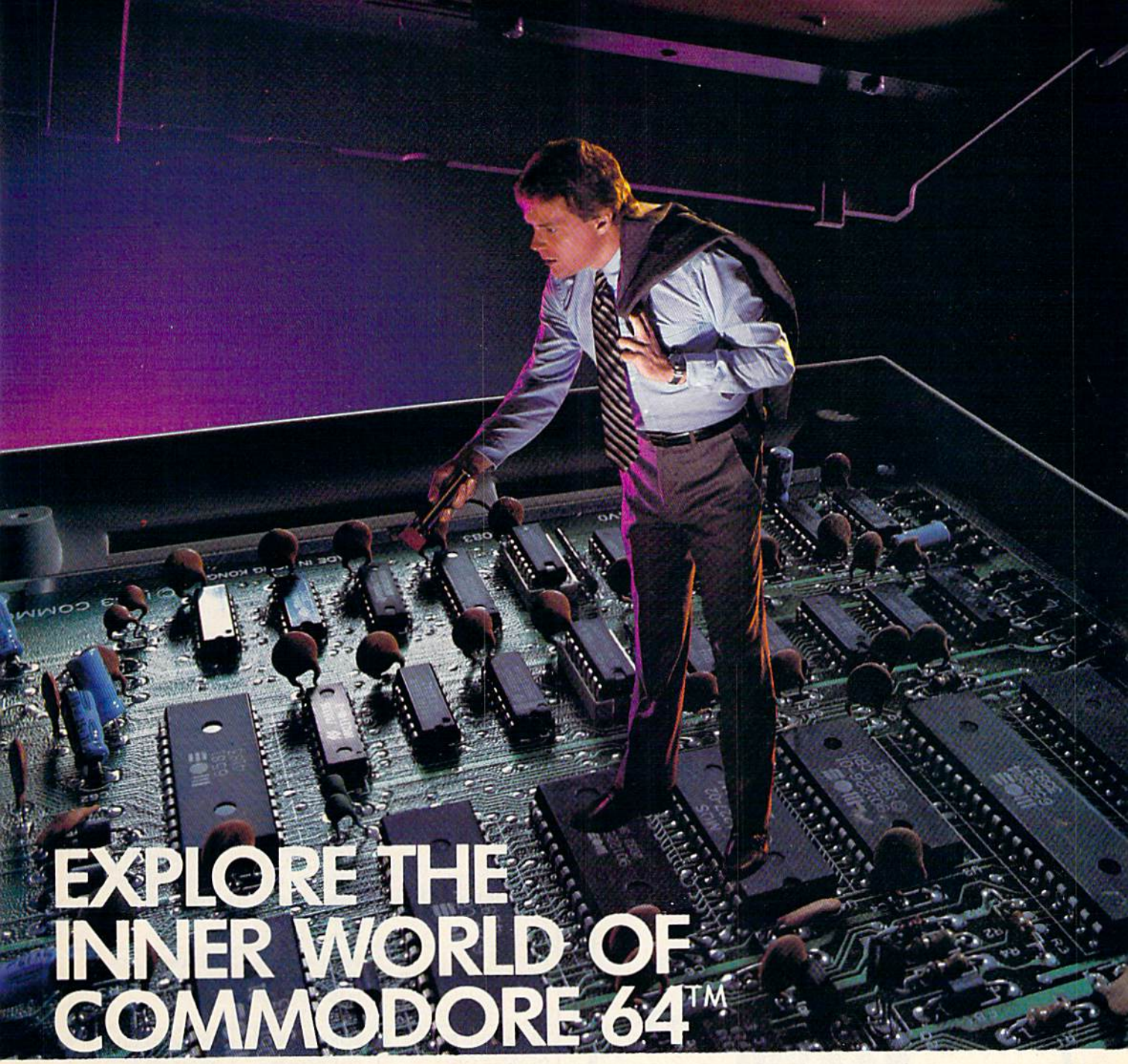
I am trying to write a machine language game using sprites and am having trouble with the collision register ($D01E). I've found out that if I read the register a second time in machine language, all I get is a zero, not any current collisions as I do when I PEEK the register in BASIC.

It is a great waste of time to return to BASIC just to PEEK the collision register. Certainly there must be a way to get the computer to reset this register in machine language. How do I overcome this?

Sean D. Wagle

The problem you describe occurs because a small amount of time is required for the collision registers to reset after they are read. Any time you read these registers, whether from BASIC or machine language, they are automatically set to zero afterwards. Since it takes a brief moment for these registers to reset themselves, reading them over and over at machine language speeds will produce some zero readings even though collisions are still occuring. The best way to deal with this problem is to add a delay so that the collision registers are read at longer time intervals. Store the results of the read in a separate storage location, then use this storage location to check for either sprite-to-sprite or sprite-to-background collisions.

The collision registers are two memory locations $D01E (decimal 53278) and $D01F (decimal 53279). The eight sprites (0–7) register collisions by setting the corresponding bits (0–7) in each of these registers. The first location ($D01E) signals collisions between sprites by setting to 1 the appropriate bit for each sprite involved in the collision. Since sprite-to-sprite collisions must always involve at least two sprites, two or more bits in this register turn on for any contact between sprites.



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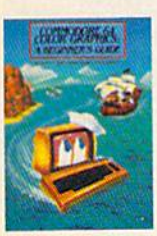

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You can find these guided tours of the Commodore 64™ at your local bookstore or computer store. Or order directly from Reston at (800) 336-0338.

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The second location ($D01F) signals contact between a sprite and a nonzero portion of the background. Like the first register, bits are turned on for each sprite which "touches" a nonzero part of the background.

Collisions occur only when solid portions of the sprite occupy the same spot on the screen as another solid portion of a sprite or background.

Renaming Disks

I have many programs now collected on disk. I find that my disk names and numbering system have become a Mulligan Stew. I would like to retitle and number them in a proper and orderly manner.

Do you know of a way to retitle and number them so that the contents of the programs are not harmed in any way?

James R. Maloney

While it is simple to rename a program on disk, it is more complicated to rename the actual disk. If done incorrectly, it may ruin the disk directory. If you want to rename a disk, it is best to format a new disk with the desired name and ID number, then copy all the programs from the old disk to the new.

Changing the names of the programs *on your diskettes is easy, however, and can be done with one command. Here's the format:*

```
OPEN 15,8,15: PRINT#15,"R0:newname=oldname":
  CLOSE 15
```

where R0: means rename, newname *is the new name you wish to give to the program, and* oldname *is the current name.*

If you wish to rename more than one program, enter and RUN this program (for both the VIC and 64).

```
10 CLOSE15:OPEN15,8,15
20 PRINT"{CLR}{DOWN} RENAMING PROGRAMS"
30 PRINT"ENTER OLD NAME:":INPUTO$
40 PRINT"ENTER NEW NAME:":INPUTN$
50 PRINT#15,"R0:";N$;"=";O$
60 PRINT"{DOWN} PRESS {RVS}F1{OFF} TO REP
   EAT"
70 GETA$:IFA$=""THEN70
80 IFA$<>"{F1}"THENEND
90 GOTO20
```

Useful POKEs

Here is a data table showing some useful POKEs. We use it here at our school, 100 Mile Junior Secondary, British Columbia. I am sure there are others who could benefit from this compilation.

Dave Schneider

Function	VIC	64
"Cold" Start	SYS 64802	SYS 64738
Uppercase/Graphics Lowercase/Uppercase	POKE 36869,240 POKE 36869,242	POKE 53272,21 POKE 53272,23
Disable STOP	POKE 808,127: POKE 788,194	POKE 788,52: POKE 808,239
Enable STOP	POKE 808,112: POKE 788,191	POKE 788,49: POKE 808,237
Disable STOP, RESTORE, and LIST	POKE 808,100: POKE 802,0: POKE 803,0: POKE 818,165	POKE 808,225 or POKE 808,234
Enable STOP, RESTORE, and LIST	POKE 808,112: POKE 802,243: POKE 803,243: POKE 818,133	POKE 808,237
Disable RESTORE	POKE 792,90	POKE 793,203
Disable SAVE	POKE 818,73	POKE 819,245: POKE 818,32
Enable SAVE	POKE 818,113	POKE 818,245: POKE 818,237
Disable Repeat	POKE 650,0	POKE 650,0
Enable Repeat	POKE 650,128	POKE 650,128
Disable LIST Enable LIST	POKE 775,200 POKE 775,199	POKE 775,200 POKE 775,167
Clear Keyboard Buffer	POKE 198,0	POKE 198,0
Disable Keyboard Enable Keyboard	POKE 649,0 POKE 649,10	POKE 649,0 POKE 649,10
Restore Keyboard	POKE 650,0	POKE 649,10: POKE 808,237

Thank you. We're sure our readers will find the table helpful. When using the POKEs to disable LIST, note that RUN/STOP–RESTORE will not *reset the computer.*

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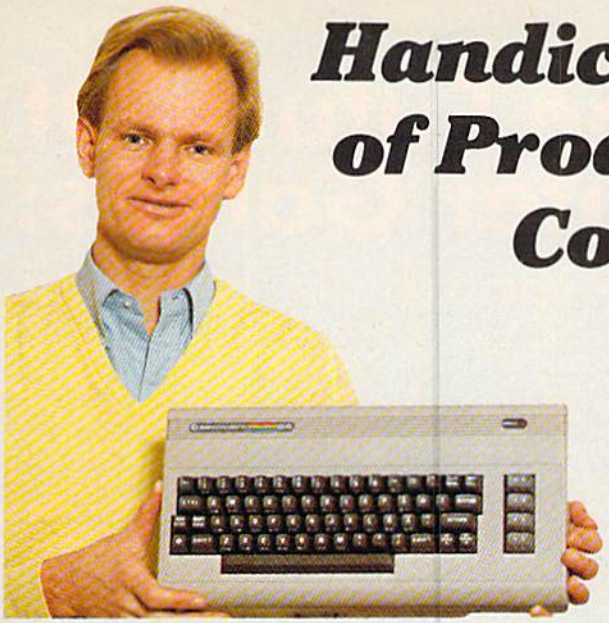

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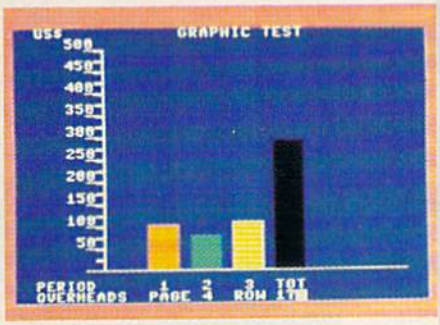

Calc Result Easy $49.95

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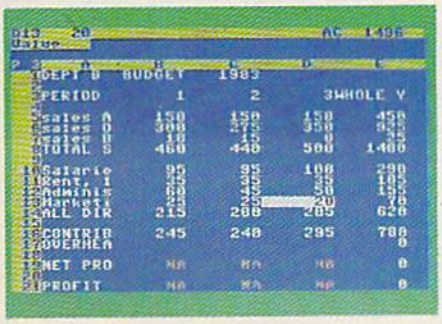

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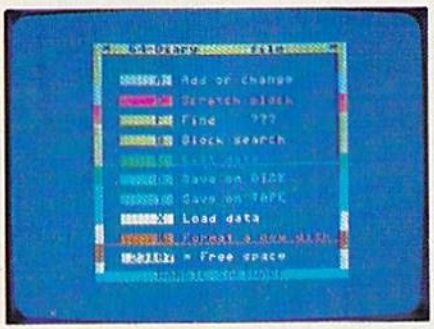

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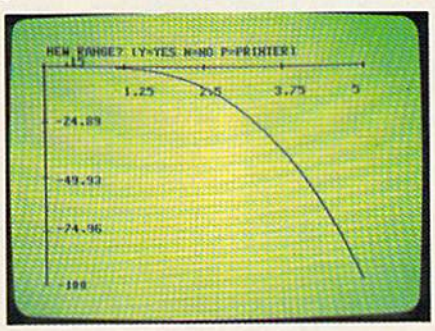

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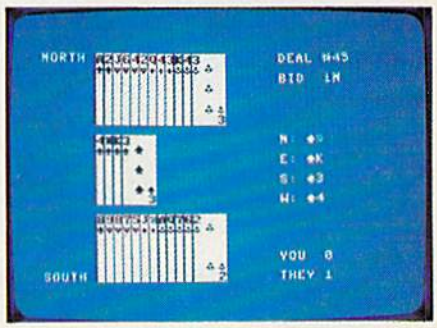
Develop your bridge skills

Whether you're an experienced bridge player or a beginner, polish your skills or learn the game with BRIDGE 64. Play North-South, then switch to East-West in the same deal, the return to that deal again and test your skill with a different strategy.



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Selby Bateman, Assistant Editor, Features

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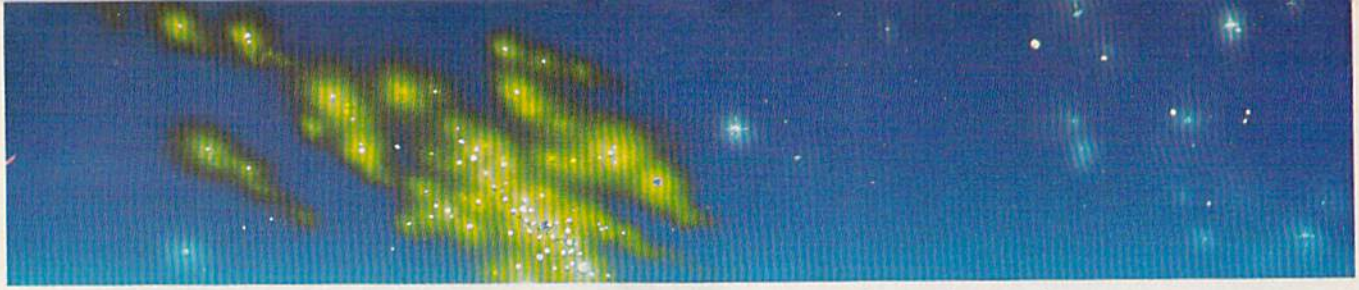

"*Seven Cities of Gold* is an attempt with the computer medium to do for the sixteenth century and the Spanish conquistadors what *Shogun* did for sixteenth-century Japan," says David Grady, publications manager for Electronic Arts.

The fact that Grady can say that with a straight face is due in no small sense to his company's remarkable track record in producing some of the most innovative and well-conceived computer games on the market.

And the new game he's referring to, *Seven Cities of Gold*, is a good example of several trends in game software we'll see in the future—more depth of play, greater background research, sophisticated humor, and increased emphasis on human qualities.

Like James Clavell's book, *Shogun*, *Seven Cities* is an attempt to recreate a past world full of rich detail. But in this world, *you* decide how almost every phase of the plot will be carried out.

"It's like writing a historical novel," continues Grady. "And when that is what you set out to do, you've got to make it work like a historical novel. You've got to immerse yourself in the period, and think about what you can do with the medium to give people the kinds of emotions that you're discovering existed in the period as you do your research."

A brief description of the game only hints at its depth: As a sixteenth-century Spaniard, you lead an expedition to discover the new world, first outfitting your ship, getting the king's blessing, and then sailing off to—who knows where? There are thousands of miles of ocean in which to get lost and the prospect of a mutinous crew. There are natives who may be hostile, friendly, or just wary. And there is the entire new world for you to explore, settle, and—as in history—to plunder. But beware. The new world holds penalties for too rapacious an attitude.

The game, created for Electronic Arts by Ozark Softscape (which also developed *M.U.L.E.*) is expected to be available for the Commodore 64 and Atari machines by the time you read this, and for IBM and Apple computers later this year.

"As you get computers which have more memory available and more speed, programmers are going to take advantage [of these] to do more richly complex things," says Grady. "And building models of things that work in the world is one of the neat things you can do with a computer."

There is a focused attention among computer game producers today, much like the concentration that would come with the prospect of being hanged at dawn. Why? Millions of dollars can be won or lost by software developers and the dealers who sell the software. And all of that potential profit or loss hinges on correctly anticipating what games the public will want a year or two from now.

What will the consumer buy tomorrow? "It's like trying to aim at a moving target," says Kenneth Williams, president of Sierra On-Line, one of the industry's most successful software manufacturers. His comment was made during a special seminar on computer games at last February's Softcon, the international conference and trade fair for the software industry.

Words of warning came from writer and game designer Roe Adams III, another participant in the seminar: "People are becoming more finicky about software. Game designers will have to bring people into the game.

"The software companies that will succeed are the ones which put human values in their software," he added.

That prescription will be important for the games of the future, whether they are fast-action, arcade-style games or the increasingly popular text adventures.

In *B.C.'s Quest For Tires* ($34.95), Sierra On-Line features Johnny Hart's internationally popular cartoon strip, *B.C.*, to add humor and a human touch to a colorful, fast-action contest.

As software manufacturers reach for a larger audience, they are using familiar names, faces, and situations to help consumers identify with their games. HesWare's *Minnesota Fats' Pool Challenge*, Broderbund's *Choplifter* (remember the Iranian rescue mission?), and Datasoft's *The Dallas Quest* (J.R. Ewing and the rest of the family) are examples.

The growing popularity of adventure games holds another key to the future of computer software—more sophisticated use of natural language. Early adventure games allowed the player only a limited number of commands—usually two-word orders such as "Get lantern" or "Kill dragon." The newer games, and those still on the drawing boards, use far greater vocabularies and more powerful *parsers*, which are used to interpret your commands. Full sentences can now be interpreted by game software.

Sierra On-Line is a company which pioneered

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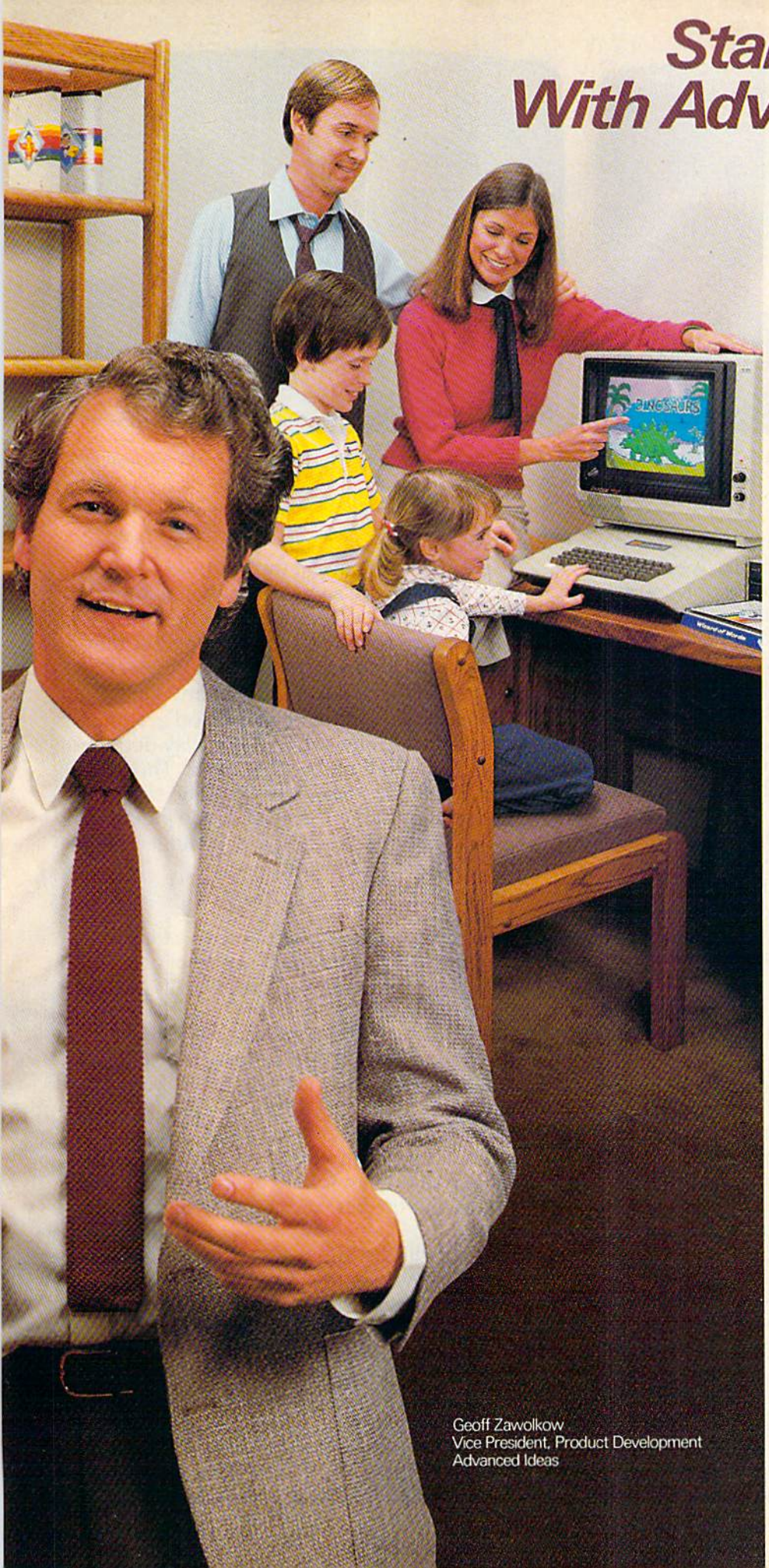

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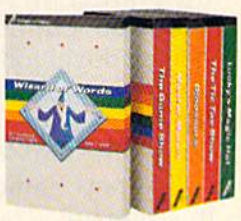

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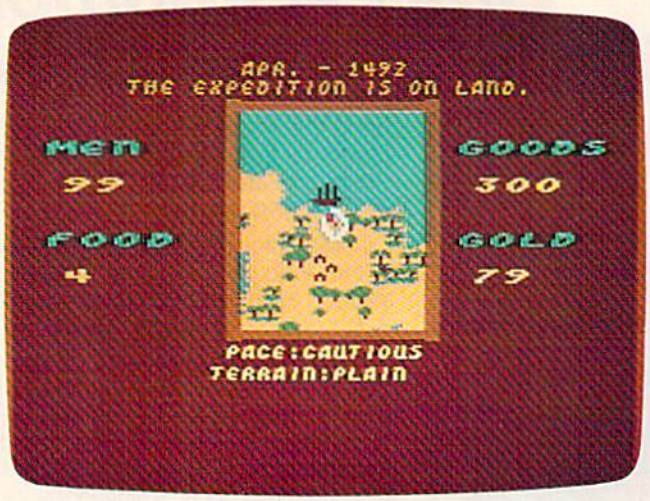
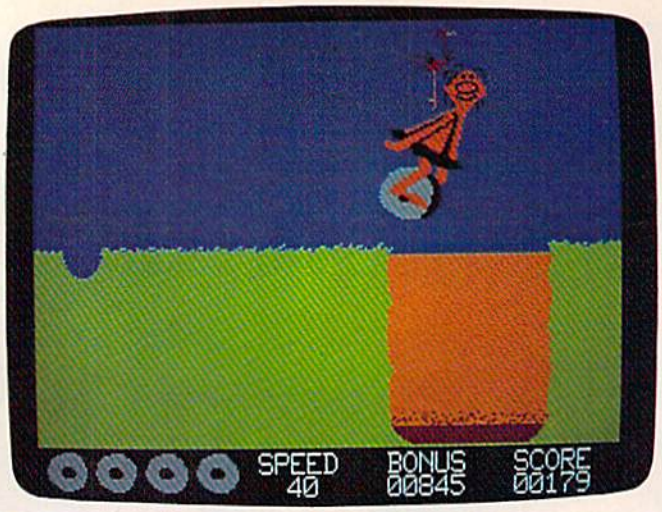


The expedition has landed on an uncharted island in Electronic Arts' Seven Cities of Gold.



B.C.'s Quest For Tires *by Sierra On-Line features a popular cartoon character.*

the use of graphics in text adventure games. "We have to lay out an adventure game like we're doing ten different games in order to get people to play it over and over again," says Williams.

King's Quest (IBM PC, $49.95) a new adventure game from Sierra On-Line, was almost two years in the making, he says. Using the keyboard and an optional joystick, you guide Sir Grahame through a series of adventures, using full sentences. There is more than one ending to the game, and a player is given points for the cleverness of a particular solution.

But, with *King's Quest*, colorful three-dimensional graphics accompany the text. Characters are animated to a greater degree than in past adventure games. They run, talk, and swim, for example. The ultimate goal for the future, Williams says, is realtime animation. You type in a command for your character to open a door and walk to another room. The door will then be seen to open, a creaking sound will be heard, and your character will walk through.

Infocom, Inc., a software company that is already something of a legend in its own time, avoids adding graphics to the complex and captivating text adventure games it produces. A variety of different games, such as the *Zork* trilogy, the murder mystery *Deadline*, and the science fiction adventure *Suspended*, has gained Infocom a fiercely loyal following. The *Zork* games sparked a Zork User Group (ZUG) which boasted more than 20,000 members. ZUG has since disbanded, but interest in *Zork* remains strong.

A new game, *Sorcerer* ($49.95), is a sequel to the company's popular *Enchanter*, and a part of Infocom's interactive fiction series in the mystic arts. *Sorcerer* can understand a vocabulary of more than 1,000 words, which allows you a much more natural dialogue with your computer. As a neophyte wizard, you depend on spells, potions, and other magic powers to find treasure and solve puzzles.

"Ultimately, the nicest thing would be to *talk* to your computer and say, 'OK, now I'm going to interrogate this suspect about where he was when the murder was committed,' something like that," says Marc Blank, a vice president at Infocom and one of the guiding lights in the company's success.

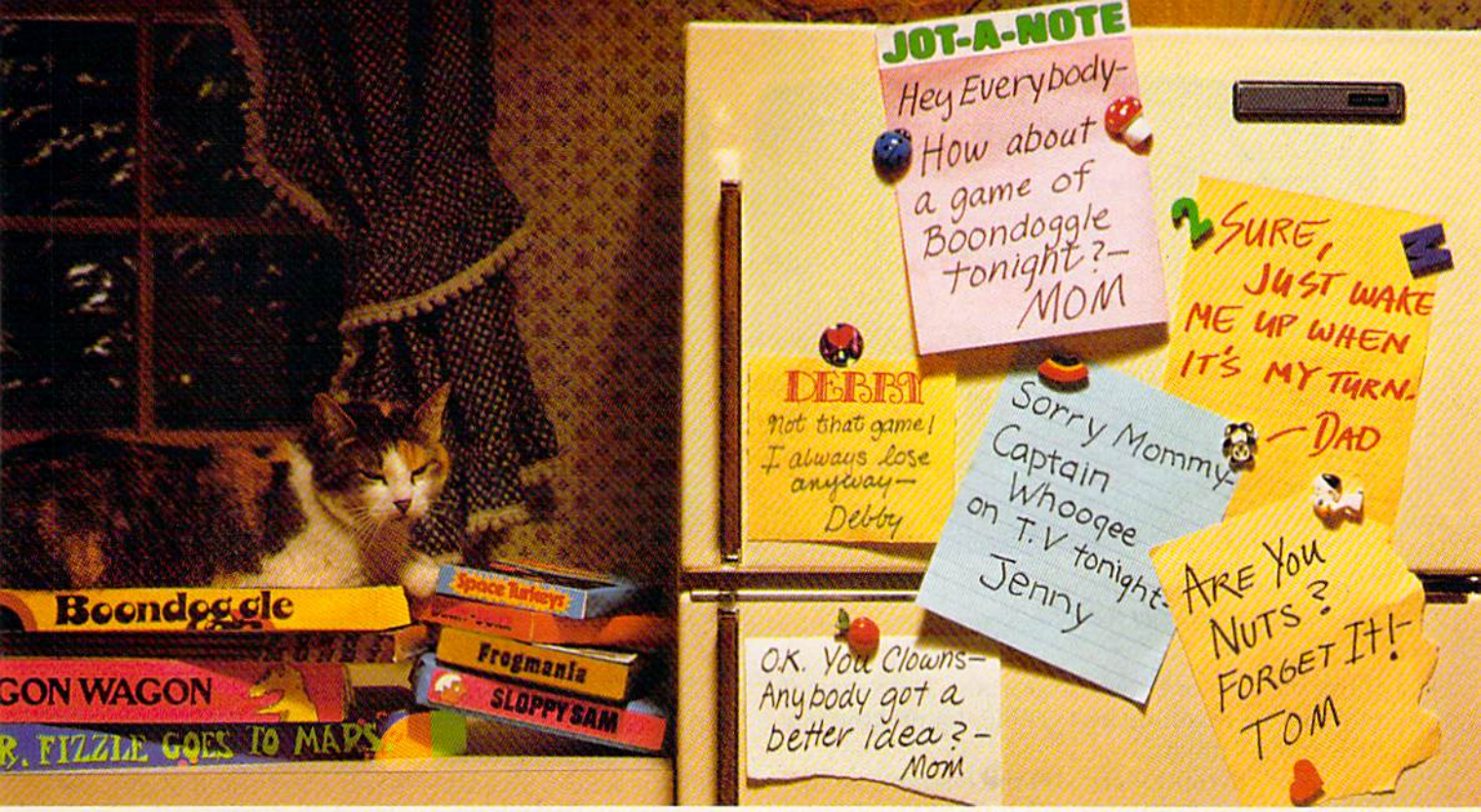
"We've always felt that sound and graphics are pretty much irrelevant, and in a way detract attention from other parts of the story. Those things are really bells and whistles," he says. "We've spent our time working on the plot and the writing, the puzzles, and the parsing—things that are much more relevant."

Text adventure games also allow great leeway in the use of humor, another part of computer programming that game developers will continue to explore in future games.

Tell Sirius's *Blade of Blackpool* that you wish to do harm to an innocent bystander, for instance, and the game's response is likely to be "My, we're feeling violent today!" Type in the word "Sneeze" in Infocom's *Planetfall*. "Gesundheit" flashes on the screen of your computer. Humor and an understanding of human foibles are facets of adventure games that the best programmers bring to their craft.

"All of us like to laugh a lot," says Electronic Arts' Grady. "We like to play. And humor just naturally flows from that situation. So we quite naturally found ourselves wanting to publish games that would make people laugh."

Infocom's Blank agrees, "Inevitably, if you're giving the player a lot of open-ended possibilities, some of them are just inherently humorous or absurd. And we all have the sense of which things we should consider when we're writing the games, and which things we shouldn't bother. I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SURE, JUST WAKE ME UP WHEN IT'S MY TURN. -DAD
DEBBY Not that game! I always lose anyway- Debby
Sorry Mommy Captain Whoogee on T.V tonight- Jenny
ARE YOU NUTS? FORGET IT! TOM
O.K. You Clowns- Anybody got a better idea?- Mom
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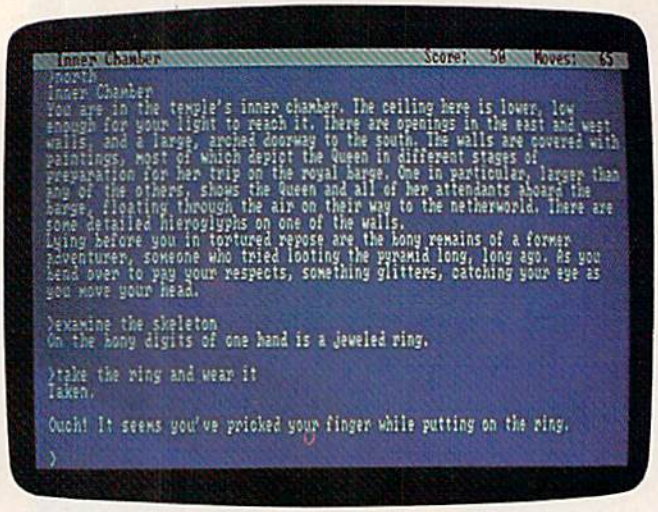
Graphics and text are combined in Sierra On-Line's adventure, King's Quest, *for the IBM PC.*


Inner Chamber
Score: 50 Moves: 65
>north
Inner Chamber
You are in the temple's inner chamber. The ceiling here is lower, low enough for your light to reach it. There are openings in the east and west walls, and a large, arched doorway to the south. The walls are covered with paintings, most of which depict the Queen in different stages of preparation for her trip on the royal barge. One in particular, larger than any of the others, shows the Queen and all of her attendants aboard the barge, floating through the air on their way to the netherworld. There are some detailed hieroglyphs on one of the walls.
Lying before you in tortured repose are the bony remains of a former adventurer, someone who tried looting the pyramid long, long ago. As you bend over to pay your respects, something glitters, catching your eye as you move your head.
>examine the skeleton
On the bony digits of one hand is a jeweled ring.
>take the ring and wear it
Taken.
Ouch! It seems you've pricked your finger while putting on the ring.
>

A typical screen from the all-text adventure, Infidel, *by Infocom.*

think the humor is very important. It's a way of making the machine less visible, by making it a little more human."

How revolutionary will the changes be in future games, as humor and human touches are added to other improvements in programming and computer capabilities? "My guess is it's going to be more evolutionary, with some reasonably large steps every once in a while. But I don't expect anything revolutionary," says Blank.

"On each game, what we're really working on is to add something new. And then every year or so to come out with something that's different, that puts all that together with other things to create a product that's more than the sum of all these improvements," he adds.

The popular success last year of a new video disk arcade game called *Dragon's Lair*, leads its creator, Don Bluth, to believe that laser-driven video disks are the wave of the future. And that includes home computers as well, he says.

Bluth, a former Walt Disney animator who now heads Don Bluth Animations, is producer and designer of a similar video game, *Space Ace*, which made its debut earlier this year.

Like *Dragon's Lair*, the new game features colorful motion-picture style animation, a cast of zany characters, stereophonic sound, and a fast-paced multiple-decision scenario for the user.

Slightly more than 25 minutes of classical animation have been programmed onto the pitted surface of a video disk, which is about the size of a record album. A laser reads the pits. "Pioneer has come up with a new machine which is a very, very fine player," says Bluth. "It has a random access which is much faster. It can randomly access several things consecutively up to about five feet of film, and you will see no search (the half-second blank-screen delay caused when the laser jumps from one part of a disk to another).

"It still uses one laser, but it's done with a mirror action. The laser is refracted and instantaneously thrown across the disk. So the only time you will see a tiny search is when you have failed to make a correct move and you access to a death scene. But if you're playing successfully, you'll see no search time," he says.

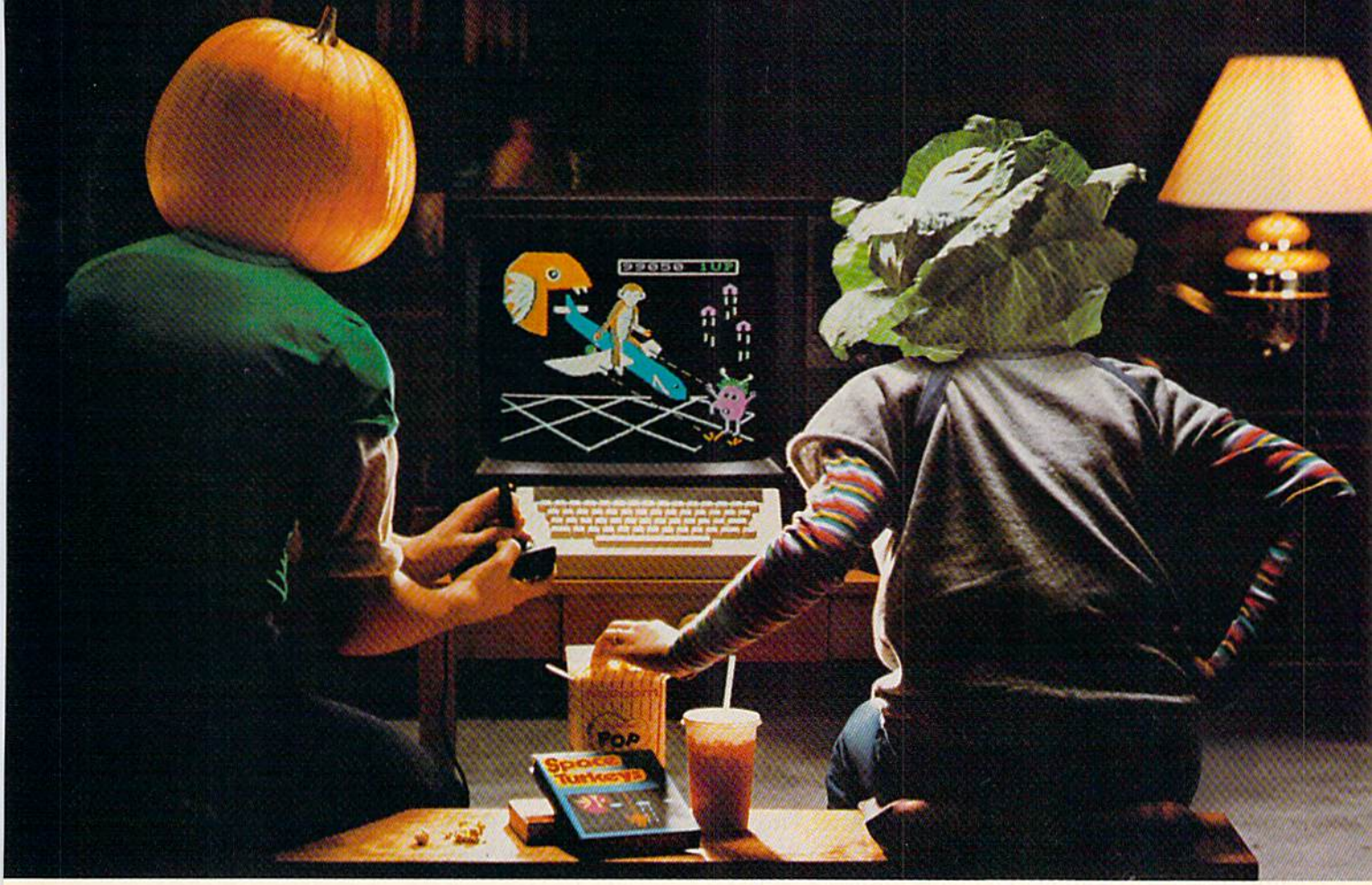
Space Ace cost about $1.8 million to develop, says Bluth. And a sequel to *Dragon's Lair*, called *Dragon's Lair II—Time Warp* is being created at a cost of about $2.3 million.

"The laser disk is a very delicate instrument, and when it's used properly, the game will be exciting to look at and to play," says Bluth. "When those two elements work in tandem, I believe you will make obsolete the traditional arcade game because we'll leave the arena of big dots and enter the arena of motion picture entertainment. If *Space Ace* works very well, then we'll know that *Dragon's Lair* was not a fluke, and that the laser disk future is very bright."

Coleco has reportedly purchased the rights to both games for possible introduction into the home through its Adam computer system, although no details about the plans have yet been announced.

"The laser disk industry will start to blossom," says Bluth. "And when that begins to happen, the price will come down. Sitting there in everyone's living room, with all the other players that they'll have, will be a laser disk player."

A unique enterprise started this spring in Orange County, California, which—if successful—will bring a television-based games service to the nation. Called The Games Network, this system offers 20 different computer games



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Classic animation produced by a laser disk is a feature of Don Bluth's new Space Ace *arcade game.*

which can be downloaded from your television screen into a specially leased 64K microcomputer (not a stand-alone) named The Window. The Network will offer a variety of educational, arcade, and adventure games. Five new games will be added and five old games dropped each month by The Network.

For a suggested one-time installation fee of $30 and a monthly suggested user fee of $15.95, you can play any of the games night or day, seven days a week at no extra charge. Downloading to personal computers would present the problem of software piracy, which is not a possibility with The Window, says Randy Wise, director of subscriber services for The Games Network.

"We're a programming service similar to HBO or Showtime, except that we need special hardware to run," he says. "There is no up-front cost to the cable operator. We put in the head-end hardware, and release the hardware to the cable operator to put into the subscriber's home. All of the payments for that are based on subscriber fees, so we've made it as easy for the cable operators to get into The Games Network as it is for subscribers."

A test of the system over a year ago in Fullerton, California, resulted in a very good response, says Wise.

"There are some interesting concepts here which no one has had a chance to explore yet. People can look at a program and get used to it on The Games Network. If it's something they like, then they're more likely to want to go out and buy it," he says.

The Games Network plans to coordinate its offerings with software companies. New software may be previewed on the system, and classic computer games might be given new life when millions of new users see them for the first time, he notes.

"We feel many millions of people will be exposed to computers who right now don't know anything about them. And once they gain some familiarity through the painless procedure of playing games on The Games Network, they'll get interested in buying hardware and software," says Wise. "We feel it's going to actually speed up the whole computerization of America."

As the world becomes more computerized, it's certain that games will continue to hold a special fascination for millions of computer owners. And software manufacturers are making it clear—by their new products and their plans for the future—that they're doing far more than just playing games.

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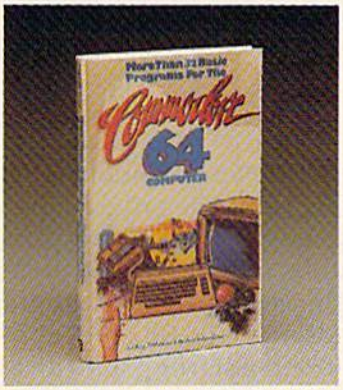

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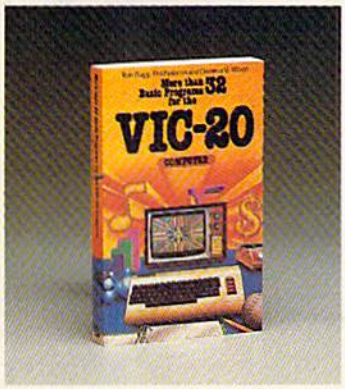

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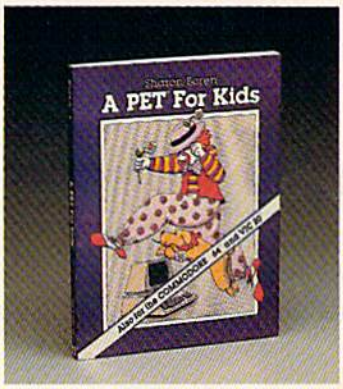

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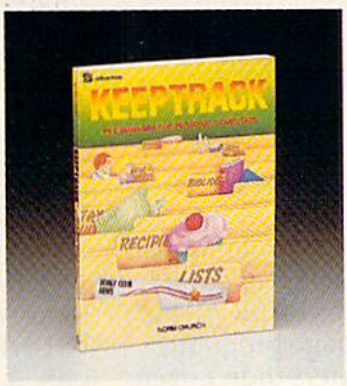

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SIMPLE ANSWERS TO COMMON QUESTIONS

TOM R. HALFHILL
FEATURES EDITOR

Q A

Each month, COMPUTE!'s GAZETTE *will tackle some questions commonly asked by new VIC-20/Commodore 64 users and by people shopping for their first home computer.*

Q. ***I've been reading a little about machine language, and I'm confused about the difference between machine language and assembly language, and machine language monitors and assemblers. Can you explain?***

A. A thorough discussion would require much more space than we have here, but essentially machine language and assembly language are the same thing. The terms are used pretty much interchangeably these days, although we prefer to say "machine language."

The term *assembly language* comes from *assembler*. You can think of an assembler as a utility—a tool—for putting together (assembling) a machine language program. You don't need an assembler to write machine language, but it makes the job a lot easier.

The earliest computers could be programmed in machine language *only*. They lacked enough memory to hold a language such as BASIC (which itself is just a large machine language program). The first kit-built personal computers didn't even have keyboards. Instead, there were eight toggle switches on a front panel, one for each bit in a byte. To write a program, you had to toggle the switches in hundreds of different patterns. (If you think typing in a BASIC program listing is laborious and error-prone, you ought to try this.)

An assembler is a utility program which automates this process. You type in a three-letter abbreviation for a command, called a *mnemonic* or *opcode*, and the assembler sets the internal "switches" in the correct pattern for you.

A *monitor* (not to be confused with a display screen) also is a tool to make machine language programming easier. A monitor is like a window into the computer's memory. You can examine sections of memory, change their contents, move them around, and search for certain numbers. Many monitors even include mini-assemblers.

Machine language programmers are divided into two camps: those who write their programs with monitors, and those who prefer assemblers. Beginning machine language programmers whose backgrounds are in BASIC probably would feel more comfortable starting with an assembler. But monitors are useful too, especially for debugging programs created with assemblers.

Q. ***If I send a command to the disk drive and there is no disk in the drive, does this cause any damage?***

A. Absolutely not. The disk drive's red LED "busy light" will glow for a few seconds as the drive attempts to access the nonexistent disk, and then it will start blinking. A blinking busy light indicates an error condition. But the drive will not be damaged in any way. The LED will stop blinking the next time you access the drive, or when you read the error channel (see your user's manual).

In fact, there is no way you can physically damage your computer or any of its peripherals by entering any kind of command at the keyboard. At worst, you might issue a series of commands which could lock your printer into an "endless loop" and cause a paper jam or eventual burnout. But even this is highly unlikely, and would happen only if you left the printer running unattended for a while.

Occasionally an erroneous series of commands will trap the disk drive in an endless loop. This might occur if you're writing a program which accesses the disk drive and you forget to provide an escape from the loop. If left alone, the drive might continue spinning indefinitely and eventually overheat. But again, you'd have to be ignoring the situation for quite some time before this happened.

In any case, no matter how badly you goof up, you can always completely reset the computer system by turning everything off for a few seconds and then back on again. Any program or data stored in the computer's memory will be wiped out, of course, which is why it's important to save copies on disk or tape.

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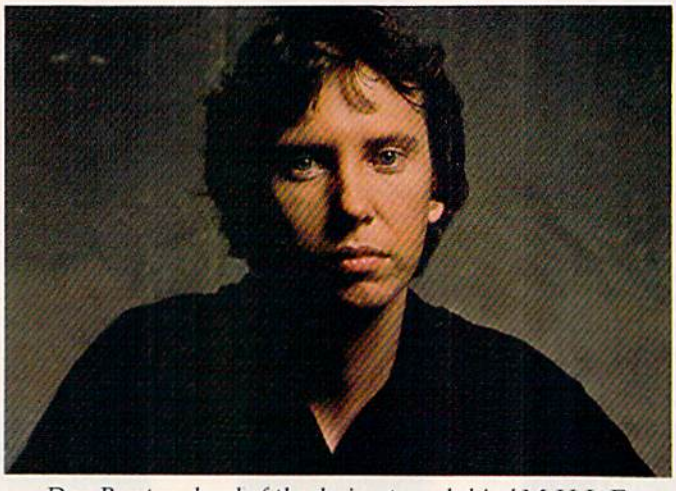
The Designers Behind *M.U.L.E.*

Kathy Yakal, Editorial Assistant



Dan Bunten, head of the design team behind M.U.L.E.

They're all over 30—"old men in the computer field," by their own admission. But they've written a game with enough depth and charm to keep the most discriminating videogame players happy for hundreds of hours. They're the design team behind *M.U.L.E.*: Dan Bunten, Bill Bunten, Jim Rushing, and Alan Watson.

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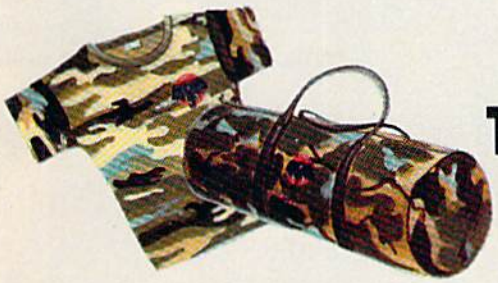

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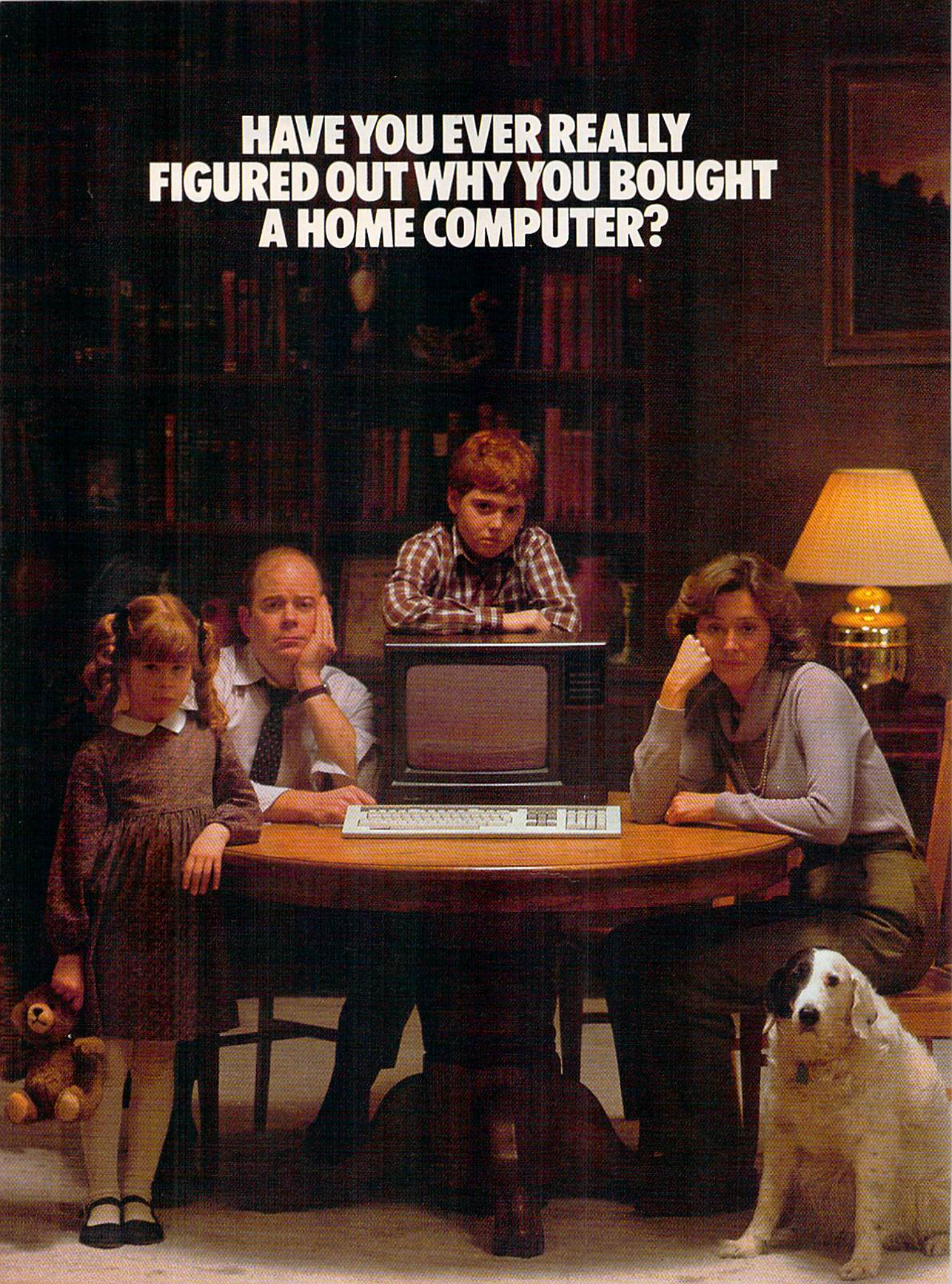
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He's basically a good little guy. Maybe a tad klunky and weird-looking, especially as he lopes across the screen before the game begins, but he's got a tough job. Some consider him endearing.

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And you can't do it alone. You need the help of your companions. You need nerve. You need your M.U.L.E.

Millions of miles from that imaginary planet, in a residential district in Little Rock, Arkansas, sits a house, rather homey and comfortable. Across the street is a park and a little lake.

This is the home of Management Systems Engineering, otherwise known as Ozark Softscape. Otherwise known as Dan Bunten, Bill Bunten, Jim Rushing, and Alan Watson, the designers of *M.U.L.E.*

Dan, head of the design team, has a background in industrial engineering, and has worked in a number of "traditional" careers, including a stint as an assistant city manager.

He wrote his first microcomputer program in 1979. Named *Wheeler Dealer*, it was a business simulation for the Apple. "It was really very primitive," says Bunten. "Looking at it now, I say to myself, 'Did people really do those kinds of things?' It contained a lot of real klutzy things that I wouldn't do anymore."

Wheeler Dealer was published by the now-defunct Speakeasy Software and cost $50, which was an "outrageous price," according to Bunten. "I think it sold 150 copies," he says.

Though it may not have had appeal, Bunten's first program did have something that would later become an important element of *M.U.L.E.*: It had four players. "I had to design my own hardware device that allowed four different input lines," he says.

Next came *Cartels And Cutthroats*, another business simulator, and *Cytron Masters*, a "nonwar war game," according to Bunten. *Computer Quarterback*, which was converted from a mainframe, was his best seller (6000 copies) before *M.U.L.E.*

Cartels piqued the interest of Tripp Hawkins, president of Electronic Arts. "Tripp was a real *Cartels* fan," says Bunten. "Initially, he wanted my brother Bill and me to do another game like that, a business simulator. The problem was that it was a little too cerebral, not as playable as *M.U.L.E.* It did have the kind of depth that Electronic Arts was interested in, though."

About this time, Jim Rushing and Alan Watson got involved. "Alan had been a salesman at a computer store," says Bunten. "He had written an arcade game and sold the rights to it. He was looking for some way to be able to design games full-time, but didn't think it would be possible for another couple of years. He was glad to jump at it.

"Jim Rushing had finished his M.B.A. He was looking for jobs, but didn't find anything that really interested him. In the meantime, he was learning programming on his own. His cash flow needs were so reasonable that we were able to bring him on real quick."

Ozark Softscape also has some part-time help which includes Roy Glover, who wrote the delightful theme song for *M.U.L.E.*

M.U.L.E. was the result of Ozark Softscape's first effort to design a game as a team, though Bill and Dan had played and designed games together all their lives. When Dan was 12 and Bill 10, they drew a complete naval war game on their basement floor.

"Bill and I did the main design of *M.U.L.E.*, though the initial brainstorming process involved

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everyone," says Bunten. "Bill doesn't program, so I translate the ideas into program design.

"Alan essentially takes care of the graphics and animation, how things are going to be presented. In *M.U.L.E.*, we wanted something that revolved around an auction, and some kind of pressure to get people to buy and sell to each other. We wanted some kind of creature that was going to be the mule, and creatures to represent the players. Alan took those ideas and made them into graphics and attractive screen design.

"Jim Rushing does the most serious chunks of programming. He'll take one big piece, like all of the auction dynamics in *M.U.L.E.* In his case, it's not so much design that's needed as very involved programming, a lot of effort, and flexibility."

Remember the first time you played Monopoly? It didn't take more than a few minutes to read the rules printed on the inside of the cover's box, but you probably had to keep referring to them in certain situations until you had played the game enough times to remember.

M.U.L.E. presents the same problem to many people. "It has a difficult learning curve," says Bunten. "That's a real dilemma. *M.U.L.E.* is aimed at a pretty critical audience.

"But we were a little surprised to find out that it's not as small a group as we were afraid it would be. It cuts across all kinds of boundaries that we wouldn't have expected. One of those that's quite pleasing is that quite a few women play *M.U.L.E.*

"I don't know why that is. I don't know what we did. I do know that we didn't include any overt violence, and we didn't make the game cutthroat to the point of hurting each other. There's competition, but it's within a framework of cooperation to ensure success. That's an appealing concept.

Appealing as *M.U.L.E.* may be, its designers feel that it could be more so. They're working on a Gold Edition. "You always wish you had another month to add some more depth to a game," says Bunten. "But it's a problem of diminishing returns. Each little piece of additional stuff adds a significant amount of time. The publisher has to take it away from you at some point. Electronic Arts calls it *creeping elegance.*"

In *M.U.L.E.*, Ozark Softscape allows you to step forward in time, to aid in the colonization of a planet. Their new game, *Seven Cities Of Gold*, takes you back to the sixteenth century, on an expedition to the New World.

"Ah ha!" you might think. "I know where the Incas are. I'll just go down there and take all the gold and head back to Europe."

It can't be done. "We want to convey the feeling that the Spaniards must have had, standing on the deck of a ship, not knowing anything about what was to the west," says Bunten. "Most of us know too much about geography to be able to experience that feeling. So our game is built on the sense of wonder and awe at the size of the world that the conquistadors were discovering."

To try to accomplish that ambitious goal, Rushing wrote a random world generator, which took about four months. "We tried to do some of the more difficult state-of-the-art graphics stuff," says Bunten. "I guess it will be up to the market to decide if we succeeded.

"A lot of strategy games are still keyboard-oriented. They leave it up to you to create an ambience. I don't think you should expect people to do that. I really think you must present them with as complete and visually appealing an environment as you can."

An important element of *Seven Cities* is interacting with the natives. That's done through a joystick for two reasons, says Bunten. "In the first place, it's easy to be nonverbal with a joystick. That's the design reason. The other is that the natives and the Spanish didn't share a language and pretty much had to live off what they perceived the other to be attempting."

Bunten fears that *Seven Cities* may be offensive to some people's sensitivities. "Many of the conquistadors treated the natives horribly," he says. "Theirs was an arrogant and prideful approach to a society that had its own history and roots.

"But to be historically accurate required that we had to include violence. I don't like the idea of players hurting other things, but there's no alternative or you're forcing your own moral decisions on an audience that ought to have the choice themselves.

Prentice-Hall speaks a language other publishers have forgotten.

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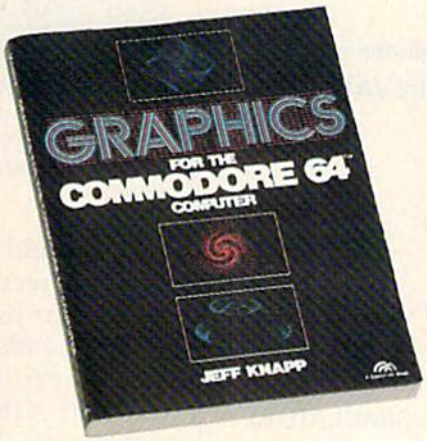

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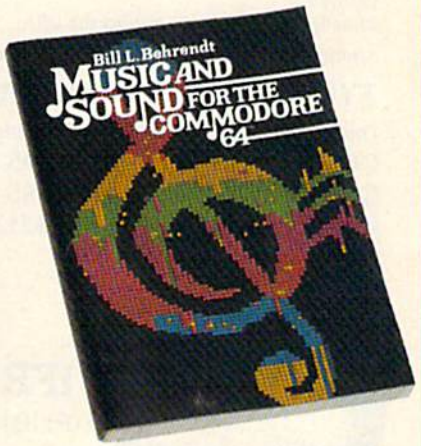

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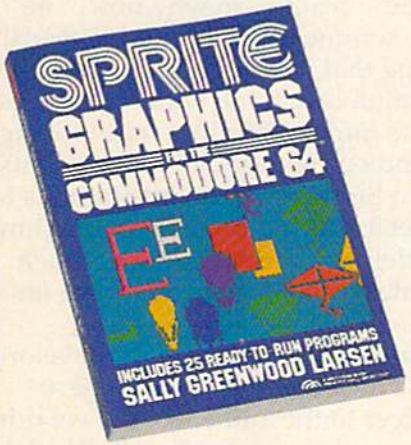

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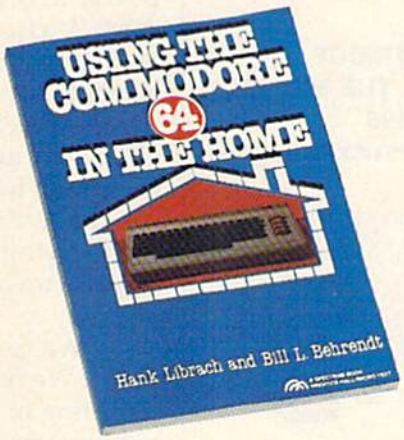

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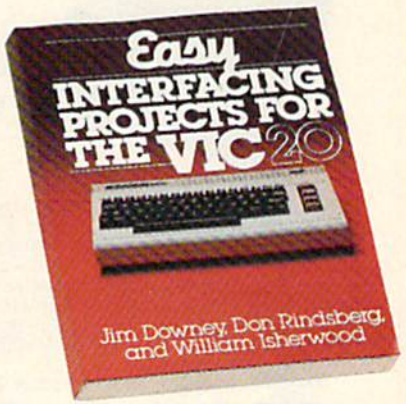

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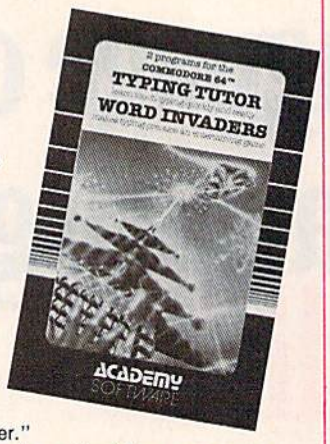

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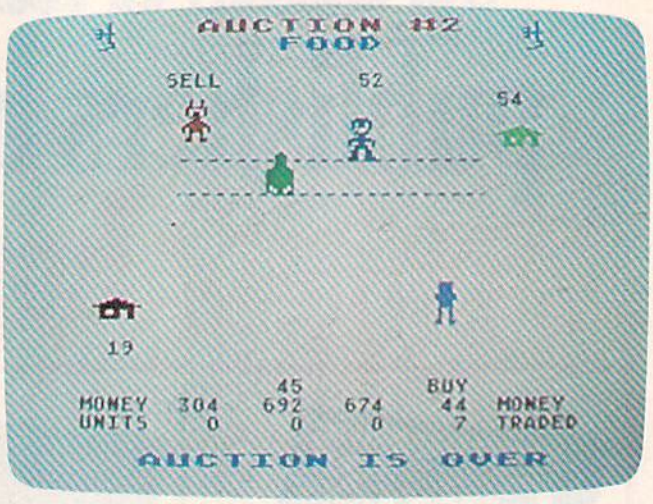

The laws of supply and demand affect whether players buy or sell and at what price.

"Bill and I were real Indian sympathizers when we were growing up. We always sided with the Indians instead of the cowboys. It just seems like such a neat, romantic culture to us, so in tune with the earth. Then to write a game where at least part of the game is wiping out Indians—that's problematic."

Bunten believes that players will face the same moral dilemma that they did designing the game. "The player will know that they have the power to beat these people, so why not?," he says. "Actually, conquest is efficient, inexpensive, and so tantalizing that it's tough to avoid it. But the optimal solution is to trade with the natives."

If *M.U.L.E.*'s mules and other odd-looking characters are endearing to some, they're gems in the rough to Dan Bunten. "It's a little fatuous to say that we're really hitting home with the things we're trying to deliver," he says. "How much impact can a klutzy cartoon character have on you?

"We're in such primitive stages of development. We have a message that we may be attempting to deliver to the audience, but we don't yet have the mechanics of delivering it. We don't know the grammar yet.

"What we're trying to accomplish in any particular game is to create such an attractive vision or fantasy that people just get sucked into it. One of the neatest accomplishments is when people start taking metaphors from your games and applying them to situations in their own lives."

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ROBERT SIMS, ASSISTANT EDITOR

Navigating The Networks

Of all the information utilities and data bases available to home computerists, four are best known to Commodore computer owners: Dow Jones News/Retrieval, Delphi, CompuServe Information Service, and the Commodore Information Network (accessed through CompuServe).

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From Stocks To Poetry

Dow Jones is oriented almost exclusively to business and finance. With services such as *The Wall Street Journal* on-line, and current stock quotes, it is the leader in business services.

Delphi offers the fewest services because it's new (about a year old). But its newness has advantages. It's not crowded with established services, so there are plenty of opportunities for entrepreneurs to enter the home telecommunications market under its network umbrella. And, since newer services tend to be more experimental and innovative, the more adventurous computer users are likely to find something of interest and value on Delphi. For example, Delphi has a feature called Writer's Corner, where authors can publish their works and receive royalties when other users read them. Also, Delphi maintains a much more informal atmosphere, both in its menus and home computing services.

CompuServe offers the advantage of size, with the widest available range of business and home services. In addition, it has a whole library of documentation at reasonable prices. And CompuServe sells *Vidtex* terminal software tailored for the special capabilities of most computers.

Special Interest Groups

CompuServe members can access Commodore's Information Network without extra charge. Operated by Commodore Business Machines, Inc., the network contains Special Interest Groups (SIGs) for the VIC-20, 64, PET, and Commodore's business computers. There's also a separate SIG for programmers.

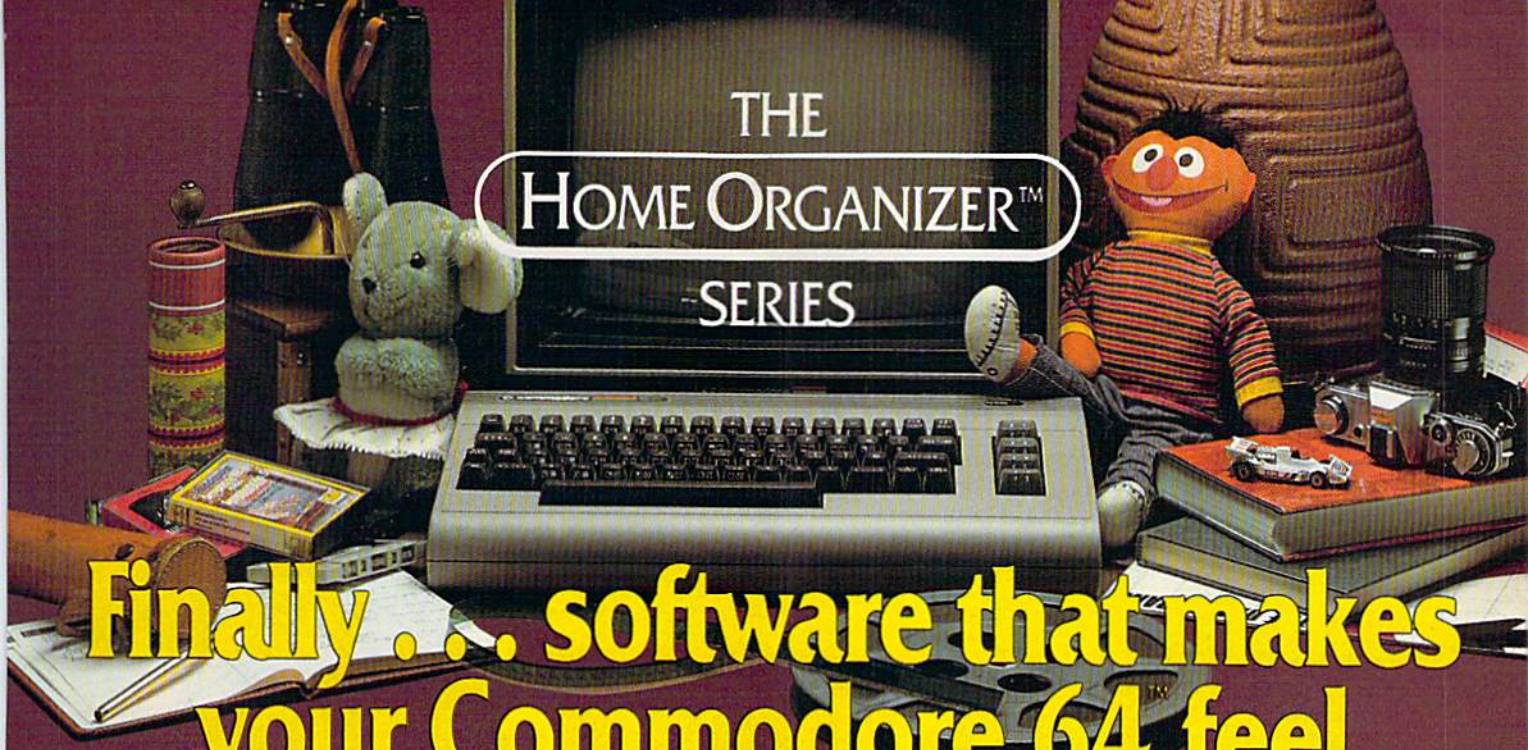
Each SIG comprises a bulletin board, conference lines, and several data base access areas in which you can upload and download public domain programs. Commodore operates an on-line Computer Club and user group which is separate from the other SIG services. There is a $10 membership fee, for which you get a newsletter, a quarterly catalog for ordering computer supplies and software at a discount, and a club access area where you can upload and download special club programs.

Accessing The Networks

All the networks provide their subscribers with documentation on how to *log on* (connect to the network), with a toll-free 800 telephone number to call if users have problems making the connection. Access to Dow Jones and Delphi are provided through third-party *value-added carriers*. These companies maintain phone numbers in most metropolitan areas. Users call these local numbers and type in the special code sequence which the carrier uses to connect the caller to the network.

Dow Jones is accessed through the carriers Telenet, Tymnet, or Datapac (for Canadian subscribers). Delphi uses only Tymnet. To access CompuServe (and the Commodore network), you can use CompuServe's own telephone numbers, as well as Telenet, Tymnet, or Datapac.

Most networks include the carrier costs in their regular charges to users. However, if there is a CompuServe number available and you choose



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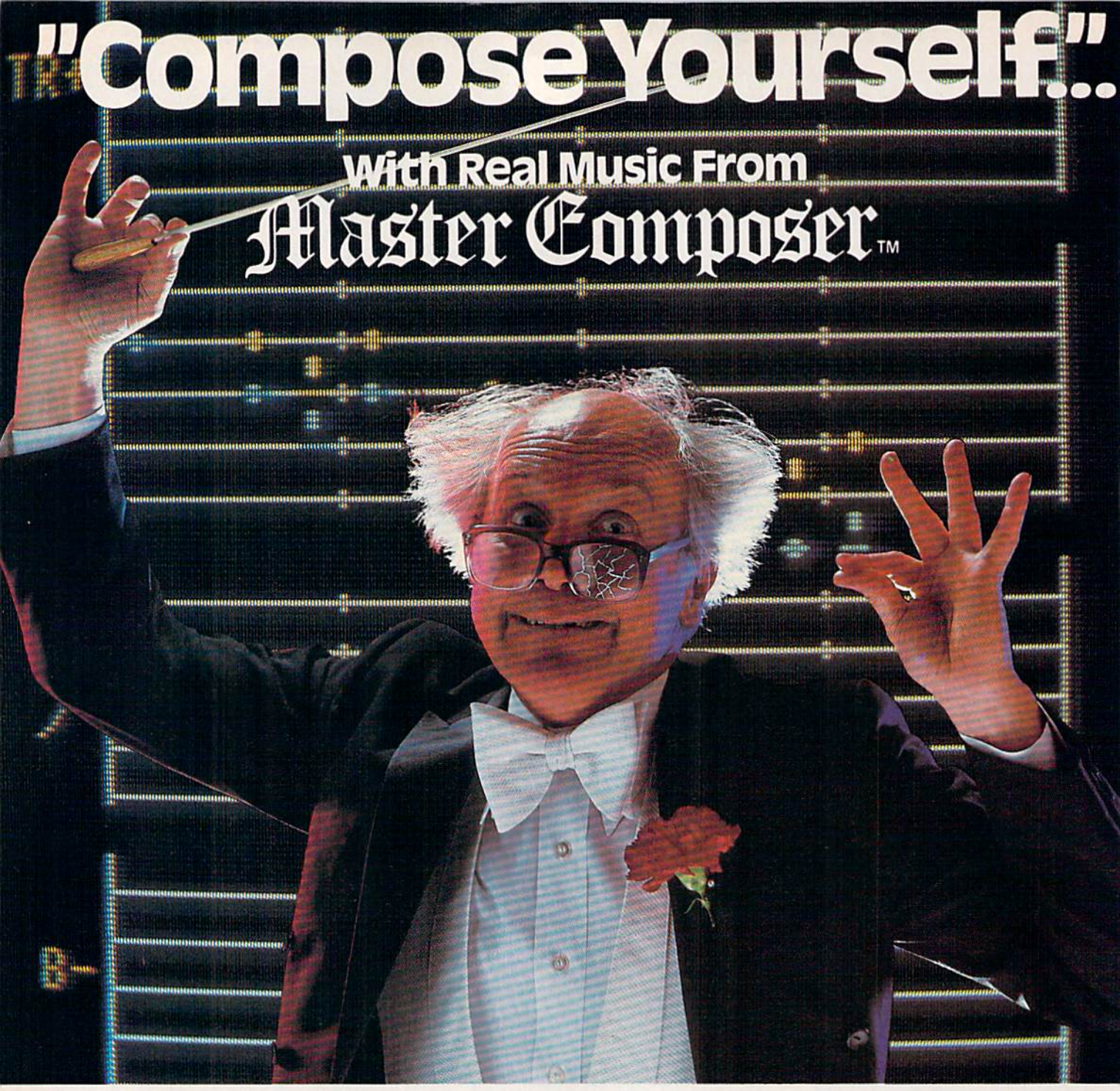

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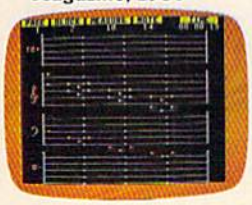

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to use Telenet or Tymnet, you may be assessed a surcharge for using the alternate carrier.

Each of these numbers is a local call, even if you're in California calling a computer complex in Massachusetts. (If you live outside a metro area and must call long distance to a carrier number in a nearby city, you are charged the long-distance rate to call that number.)

Facing The First Menu

All four networks are menu-driven and allow the user to choose the service he wants. Delphi, CompuServe, and Commodore also offer the option of verbose (complete) or brief menus. You can choose a menu with or without explanation of menu items and commands, or you can simply receive a prompt. Experienced users save time by switching to the abbreviated menus or prompts.

Dow Jones has a different procedure from the others in that it doesn't automatically send a menu when you log on. After your password is verified, you are prompted to ENTER QUERY. At this point you can go directly to any service, ask for an introductory menu, or go to the main menu. A new user would best benefit by typing //INTRO for the introductory menu. A welcome screen appears, then a menu like this:

PRESS	FOR
1	Closing Dow Jones Averages retained
2	Weekly economic update revised on Fridays
3	News/Retrieval operating hours expanded
4	Customer Service Information

Type 4 to get the basic information needed to use the network, change your password, and perform other recordkeeping chores. When that's completed, type //MENU to get the main menu:

TYPE	FOR
//CQ	Current Quotes
//DJ NEWS	Dow Jones News
//HQ	Historical Quotes
//UPDATE	Economic Update
//WSJ	Wall Street Journal Highlights on line
//DSCLO	Disclosure II
//EARN	Corporate Earnings Estimator
//FTS	Free Text Search of Dow Jones News

FOR MORE CHOICES PRESS RETURN, FOR HELP, TYPE DATA BASE SYMBOL AND HELP. (EXAMPLE: //CQ HELP)

This is only the first page of the main menu; to see the rest, simply press RETURN.

To select a data base, type two slashes and the data base code.

Dow Jones provides a comprehensive manual (without extra charge) which contains all the information and sample menus required to use the network.

Delphi's Guided Tour

Delphi provides a free manual to each member, and also offers an on-line guided tour to give the subscriber necessary information. Printed documentation consists only of general information and a quick-reference card of network commands.

During the guided tour, instructions are given on how to change your password, how to use several control characters to move around Delphi, how to set screen length and width, and how to choose either the brief or verbose prompts. Then the main menu is presented.

Main Menu:

Bulletin Boards	Library
Conference	Mail
Delphi-Oracle	News
Exit	Online Markets
Financial-Services	Profile
Games	Scheduler
Guided Tour	Travel
Help	Writers-Corner
Infomania	

MAIN› What do you want to do?

To go to any Delphi service, type the name from the menu. The service you select will then offer other menus from which you choose particular sections of the service.

CompuServe Uses Numbers

CompuServe's menu system is more complex, with numbered menu items and system page numbers. After you log on, the main menu appears:

CompuServe **Page CIS-1**

CompuServe Information Service

1 Home Services
2 Business and Financial
3 Personal Computing
4 Services for Professionals

5 User Information
6 Index

Enter your selection number,
or H for more information.
!

The exclamation mark at the bottom of the menu is a special prompt, called a command prompt. A GO command typed at a command prompt sends you directly to any area of the network, bypassing the usual path through several menus.

The Information Menu

New users should choose item 5, User Information. This menu appears:

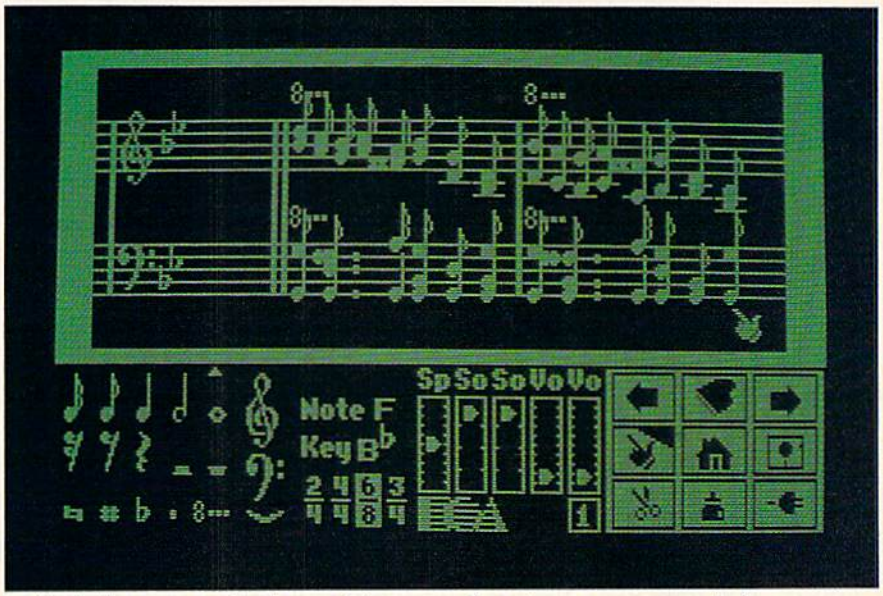
CompuServe **Page CIS-4**

USER INFORMATION

1 What's New
2 Command Summary & Usage Tips
3 Feedback to CompuServe

The END of DINKETY-DINK.

Announcing the first computer music program that actually sounds like music.



LET'S FACE IT. Up till now, music programs for your home computer have all sounded, well, pretty lame. There were the ones that resembled little electronic music boxes, remember? And then there were those that sounded like so many burps.

Enter Music Construction Set.™ It's the first music program that really makes use of the power of that machine you've got. If you're a serious student, this means you'll be able to work with an intricacy and range of sound quality you've never heard before on a computer. And if you know nothing about music, you'll find something even more important. Namely, that this thing is simple enough to be a lot of fun.

Take a good look at this screen because it, you, and a joystick are the whole story here.

That's you at the right end of the staff of notes — the little hand. Move the joystick, and you move the hand. Use it to carry notes up to the staff. Lay in rests, signatures, clefs, then point to the little piano in the lower right and listen, because you'll hear the whole thing played back.

Move those little scales in the middle up and down to vary the music's speed, sound quality, and volume. Use the scissors to cut out whole measures, then use the glue pot to paste them in somewhere else. Got a printer? Great. Print the score out and show it off to your friends.

But what if you're not up to writing your own stuff yet? No problem. There are twelve pieces of music already in here, from rock 'n roll to baroque. They're fun to listen to, and even more fun to change. (Apologies to Mozart.)

The point is, the possibilities are endless. But if you're still skeptical, visit your nearest Electronic Arts dealer and do the one thing guaranteed to send you home with a Music Construction Set in tow.

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```
4 Order Products, Guides, etc.
5 Change Terminal Settings
6 Change Your Password
7 Billing: Your Charges, Rates
    Options, Making Changes
8 Logon Instructions & Numbers
9 Electronic Bounce Back
Last menu page. Key digit or M for previous menu.
!
```

If you're a new subscriber, you'll go to this menu often to refresh your memory about commands and prompts, to check on how much money you're spending, and to ask CompuServe questions about confusing aspects of network services.

Select item 5, Change Terminal Settings, to have CompuServe configure its output for your computer. For example, choose 22, 40, or 80 characters per screen line, or have the text displayed in all capitals or in upper- and lowercase.

Changing Your Password

Select item 6 to change your password. You should do this at least once a week. A password is like a credit card number. If other users find out what it is, they can use your account and you'll get the bill. So never type your password while on-line, except when logging on or changing it here.

Another important selection on this menu is item 4, used for ordering CompuServe's manuals.

The Commodore Network

After you've finished with these recordkeeping chores, you may want to visit the Commodore network. The simplest way to get there is from the main menu. Let's suppose you have finished changing your password from the User Information menu (Page CIS-4). At the ! prompt, type M to get back to the main menu (Page CIS-1). When you see the main menu ! prompt, select item 3, Personal Computing, then press RETURN.

You will receive the Personal Computing SIGs menu (Page PCS-50). At the prompt, type 15, the selection number for Commodore. You will receive the Commodore main menu, Page PCS-160. Use this menu to access any of the Commodore SIGs.

Another, more direct, route to the Commodore network is to type GO PCS-160 at any ! prompt. This goes directly to the main Commodore menu from anywhere in CompuServe. To go directly to the 64 SIG, enter GO PCS-156, and for the VIC SIG, GO PCS-155.

The Bulletin Board

The most popular services for beginners on the SIGs are the Bulletin Board and the Conference line. On the Bulletin Board are several hundred messages on a wide variety of subjects. Areas are set aside for general messages, messages from and to software and hardware vendors, and for Hotline questions to Commodore, which are then answered on the Bulletin Board.

Commodore provides on-line instructions and a simple line editor for users who want to leave messages.

Control Characters

There are several control characters which are helpful for typing in messages and other text. Most are common to all telecommunications; a few are used differently by different systems. Control characters usually show on the screen as an up-arrow and a character. For example, CTRL-V, represented by ↑V, is sent by holding down the CTRL key and pressing V. The control characters cause the network software to interrupt what it's doing and take some other action. Some of the most frequently used:

- ↑A Tells the host computer to stop transmitting at the end of the current line.
- ↑O Aborts whatever is being transmitted and jumps to the next prompt. Used on Delphi, instead of CTRL-P.
- ↑P Aborts whatever is being transmitted and jumps to the next prompt. You can use this to jump past the introductory bulletins on CompuServe.
- ↑Q Tells the host computer to resume transmitting.
- ↑R Displays the line you are currently typing (Delphi).
- ↑S Tells the host computer to stop transmitting immediately.
- ↑U Deletes the line you are currently typing.
- ↑V Displays the current line you're typing (CompuServe).

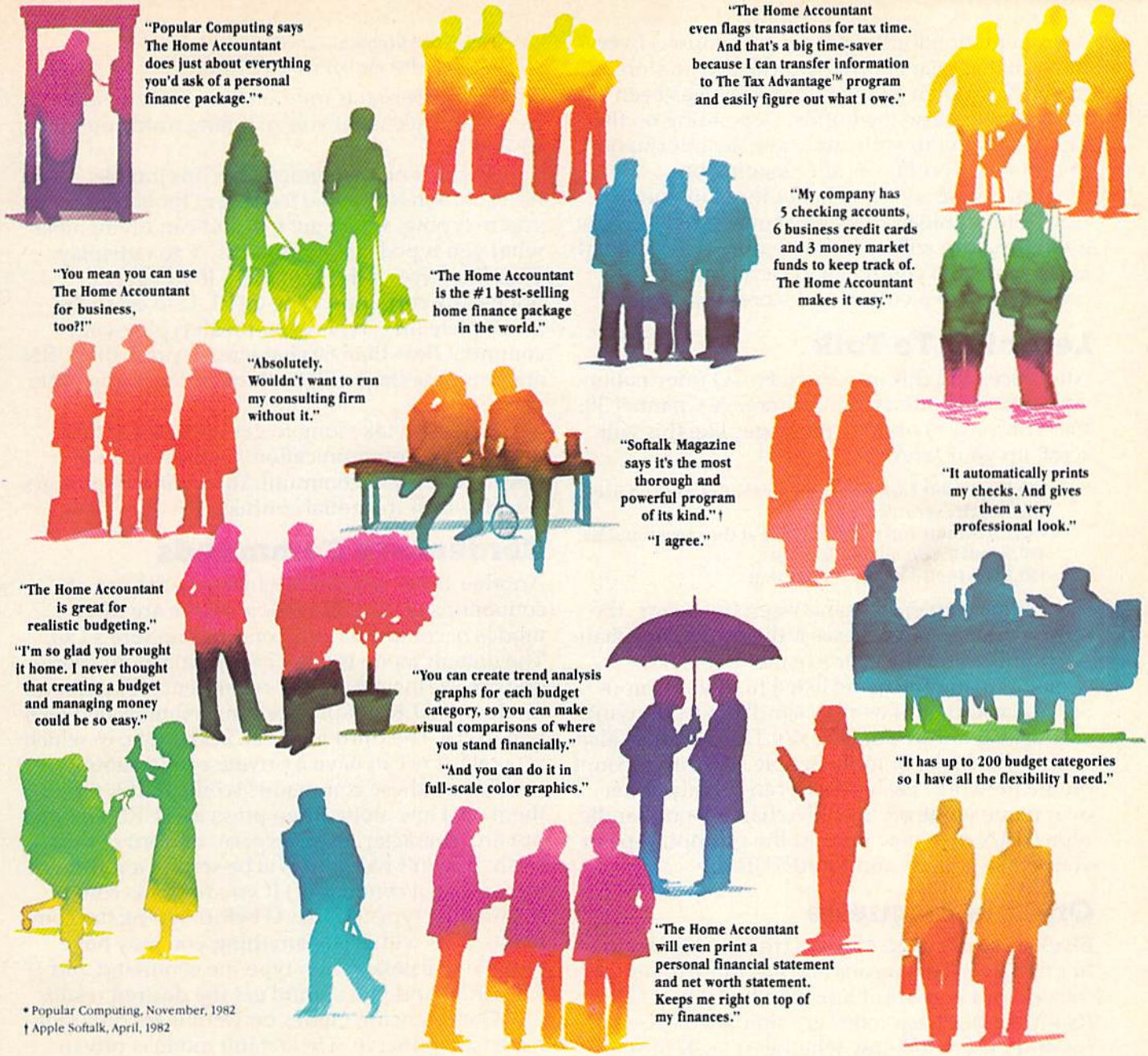
The Conference Line

The Conference service (CO) is very popular, but it can be confusing until you learn the quirks and commands. Although formal conferences are held on CO, the name is misleading because most subscribers use CO as a kind of chat service, similar to a CB radio band.

When you select CO, you see a series of short bulletins on what's happening on CO in the near future. CO also offers some pointers on frequently used commands, and outlines the etiquette to be used on-line. It's good practice to download these bulletins and command descriptions, and keep them handy while you're on-line.

Next month we'll discuss downloading and uploading in detail. For now, let's look at two simple ways to download this information. If your terminal software has a feature that dumps the screen contents to the printer, you can wait until your screen is nearly full, then press CTRL-A. Next, press the proper key to print the screen. When the transfer is completed, press CTRL-Q to resume transmission, press CTRL-A again when the screen is nearly full, dump it to the printer, and continue this process until all the information is printed.

The second method is a simple matter of opening the buffer in your terminal software before accessing the CO. (Consult your terminal software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* Popular Computing, November, 1982
† Apple Softalk, April, 1982

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documentation for the proper procedure.) Everything that appears on screen will also be stored in the buffer. When all the information has been transmitted, close the buffer. Depending on the capability of your software, save the information to disk while on-line or after logging off.

But before trying either of these methods, read your terminal software manual carefully. Any good program will include a feature that automatically sends the control characters, captures incoming data in a buffer, and stores it to disk.

Learning To Talk

After receiving this introductory CO information, you will find yourself on Conference Channel 30. If anyone else is on-line, messages like this will scroll up your screen:

```
(30,Blackfoot) I see what you mean. But can you use
the cassette recorder...
(30,Blackfoot) and the disk drive at the same time? ga
(30,SamR.) Yes, no problem. ga
(30,Blackfoot) Thanks. I'll try it. ga
```

In this conversation between two users, the information in parentheses is the conference channel number and the user's name. Users have a choice of using the name listed in their CompuServe account or of using a handle (pseudonym), as most CB radio operators do. This option is also useful when two or more people share an account on the network. Each person can use his or her own name while on-line. (To change your handle, type /HAN on a new line. At the prompt, type in your chosen name and hit RETURN.)

On-Line Etiquette

Blackfoot has typed ellipses (three periods) in her first line. This means she has more to say. At the end of her second line, she has typed GA (Go Ahead). These codes are simple but essential for other users to know whether it's OK to send their comments without interrupting the current "speaker."

When several users are on CO, it's common to see several conversations carried on at the same time. When that happens, users tend to start a remark with the name of the person they're talking to, like this:

```
(30,Blackfoot) Sam R. => I see what you mean.
But can you use a cassette...
```

Talking Back

The most confusing aspect of CO for beginners is in trying to type in their comments while other comments are scrolling up the screen. Whatever you type will appear mixed up with the incoming comments. For example, if you try to type:

```
Hello, my name is Clyde
```

your screen might look like this:

```
He(30,Blackfoot)llo,Sam R.my =>I
seenawhat me isyou mean.Clyde
```

All this gibberish is only on *your* screen; other users can't see what you're typing until you hit RETURN.

There is no real remedy for this jumble. The best solution is to avoid looking at the screen while you're typing. If you get lost and can't remember what you typed last, type CTRL-V to redisplay your line, free of the gibberish. If you get hopelessly confused, type CTRL-U to erase the incomplete line. When you finish typing your comment (less than 80 characters), press RETURN and your message will be transmitted to the other users.

It doesn't take long to get the hang of this unorthodox communication method, and the reward of instant communication with other users is well worth the initial confusion.

Conference Commands

Another tricky area for beginners is the use of commands in the CO section. There are three modes of communication on Commodore's CO. The default mode is open communication; everyone can see everyone else's comments. The second mode is /TALK, for private conversations between two users. The third mode is /SCRamble, in which several users can have a private conversation.

To use these commands while in CO, type them on a line alone, then press RETURN. If you put any character, even a space, in front of the slash, it won't work. (It will be sent as a comment rather than a command.) If you find this confusing, just type a CTRL-U before typing the command. This will delete anything you may have typed by mistake. Then type the command and RETURN, and you should get the desired result.

Conferencing modes on Delphi are different from CompuServe. The default mode is private. To join a conversation you must /PAGE one of the members of a group and get the group scramble code. Then you must /JOIN the group. There is no open conferencing on Delphi, and the commands are different, but the results are the same.

A Few Quirks

Besides the special conditions on individual services, the networks have a few general quirks which can be confusing if you're not expecting them. The strangest is a tendency for the characters on your screen to suddenly stop scrolling for no apparent reason, then start up again. This happens because thousands of people are using the system at once, and sometimes it gets a second or two behind. This occasionally happens on all the networks, but is most noticeable during peak evening hours on CompuServe.

CompuServe has become so popular that it's

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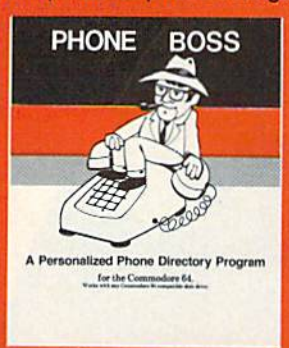

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in a constant race with its users, trying to expand its capacity to keep up with the growing numbers who log on every evening.

When the network falls behind, you may experience a delay in moving from one service to another. Delays of up to five minutes are not uncommon.

No Dead Ends

Another problem for new users is the sense of wandering in a labyrinth. Many beginners worry needlessly about getting lost in the maze of menus, of wandering into a service that charges extra for access and running up a huge bill. Or, they worry about what happens if they accidentally hang up without properly logging off.

First, it's difficult, if not impossible, to get into an extra-charge area without knowing it. Many of the services require users to sign up separately from their network membership, and unauthorized access is not possible. There are services, such as the Academic American Encyclopedia (AAE), which can be accessed without prior arrangement. However, the AAE menu includes a notice that the service involves a $2 per hour surcharge.

There are no dead ends on the networks. Even if the network software crashes (a very rare occurrence), or if a user gets nothing but garbage scrolling up the screen, the option is always there to simply disconnect the modem from the phone line.

If a user disconnects from the network without properly logging off (either by mistake or if the connection is broken by a telephone line malfunction), CompuServe's software will wait for up to seven minutes, then log the user off. During very busy periods, this may take up to 20 minutes. The user is charged for this time.

If you have questions or ideas about subjects you'd like to see covered in this column, write to: Home Telecommunications, COMPUTE!'s GAZETTE, *P.O. Box 5406, Greensboro, NC 27403. Or you can send me electronic mail. My CompuServe ID is 75005,1553. For Delphi, it's BOZART.*

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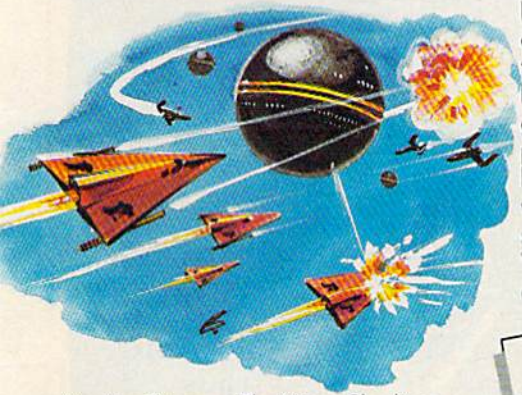

Martian Prisoner, The Viper, Skydiver, Snake Escape, Demon Star, Cyclon Zap and Oil Tycoon are just a few of the ready-to-run games you'll find exclusively in *COMPUTE!'s Gazette* each month. Just type in the programs and watch your screen explode with colorful new computer game excitement.

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3-D Tic-Tac-Toe

Mark Doyle

This two-player game for the Commodore 64 or VIC-20 with memory expansion (any amount) makes tic-tac-toe a real challenge. Joysticks are required.

Sound, color, and a three-dimensional playing board add new excitement to this old familiar game. After the title screen is displayed, both players enter their names and how many games they want to play. A multicolored three-dimensional tic-tac-toe board then appears on the screen.

The player with the joystick in port 1 (64 version) goes first. Since the VIC has only one joystick port, players must take turns with the joystick in the VIC version.

To move the cursor, at the top left corner of the board, push the joystick left or right. When you get to the desired location, push the fire button and your marker will appear under the cursor. If there is already a marker in the space, a low noise will be heard and you will have to go elsewhere.

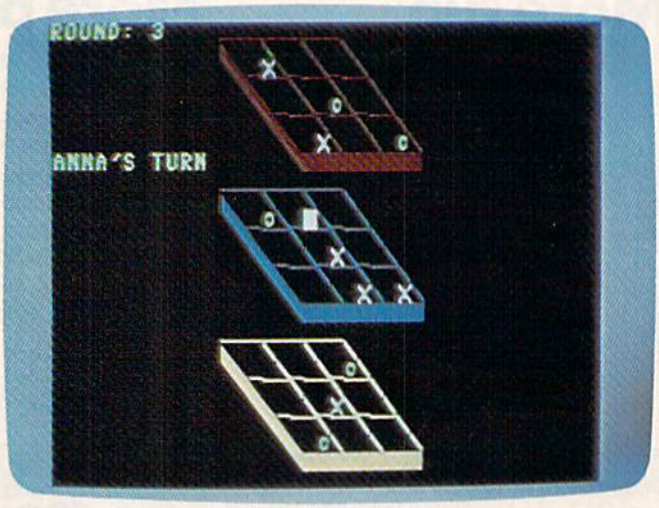
Winning Combinations

To win, you must get three of your markers in a straight line before your opponent does. They can be on one of the boards, or a combination of the three boards going diagonally or up and down.

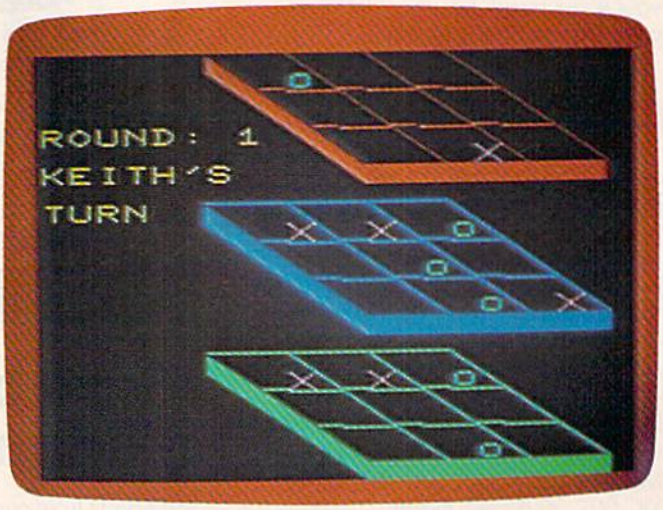
When you get a tic-tac-toe, your three pieces flash different colors and the winning sound is heard. The board is then cleared, and, if you specified more than one round in the beginning, you play again. If not, the score is displayed and the game is over.

If you don't want to type this program in, I'll be glad to make a copy (64 version only) for you. Send $3, a blank cassette, and a self-addressed stamped mailer to:

Mark Doyle
3755 Lemire Lane
Sebastopol, CA 95472



Anna is about to win this round (64 version).



3-D Tic-Tac-Toe challenges you to think in three dimensions (VIC version).

See program listings on page 177.

SOFTWARE ARTISTS?

How we got this year's hottest sports game out of two rather inexperienced designers.

TO MAKE THE FIRST BASKETBALL PROGRAM that feels like the real thing, it helps to start with two guys who know what the real thing feels like.

Enter Larry Bird and Julius Erving. Bird – the hustler, the strong man, deadly from outside. Erving – The Doctor, maybe the most explosive player in the history of the game.

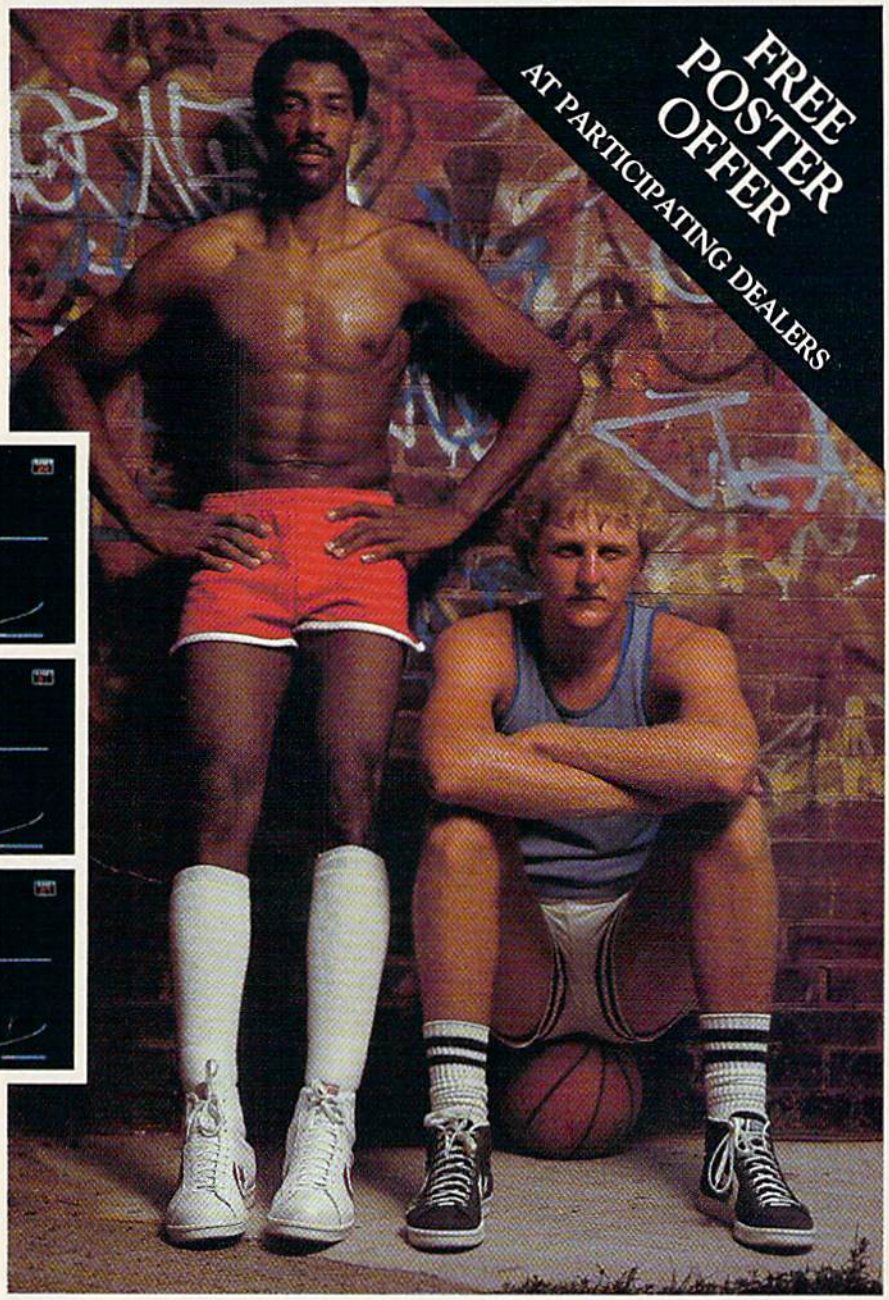
We talked to them, photographed them in action, studied their moves and their stats and their styles. Then we set out to create on computer disc an event which may never happen in real life. We put the two of them together on a dream court of light, for an electronic afternoon of one-on-one.

It wasn't easy. When they talked, we listened. When they criticized, we made big changes. When they gave suggestions, we took them.

And it shows. This thing is absolutely uncanny. You actually take on all the skills and characteristics of Bird or The Doctor – their own particular moves, shooting abilities, even strength and speed.

You'll meet with fatigue factors, hot and cold streaks, turnaround jump shots, and 360-degree slam dunks. But there's some whimsy in here, too – a funny referee, a shattering backboard, even instant replay.

It's called *Julius Erving and Larry Bird Go One-on-One.*™ You're Bird. Or you're The Doctor. And that's the last decision you'll have plenty of time to make.

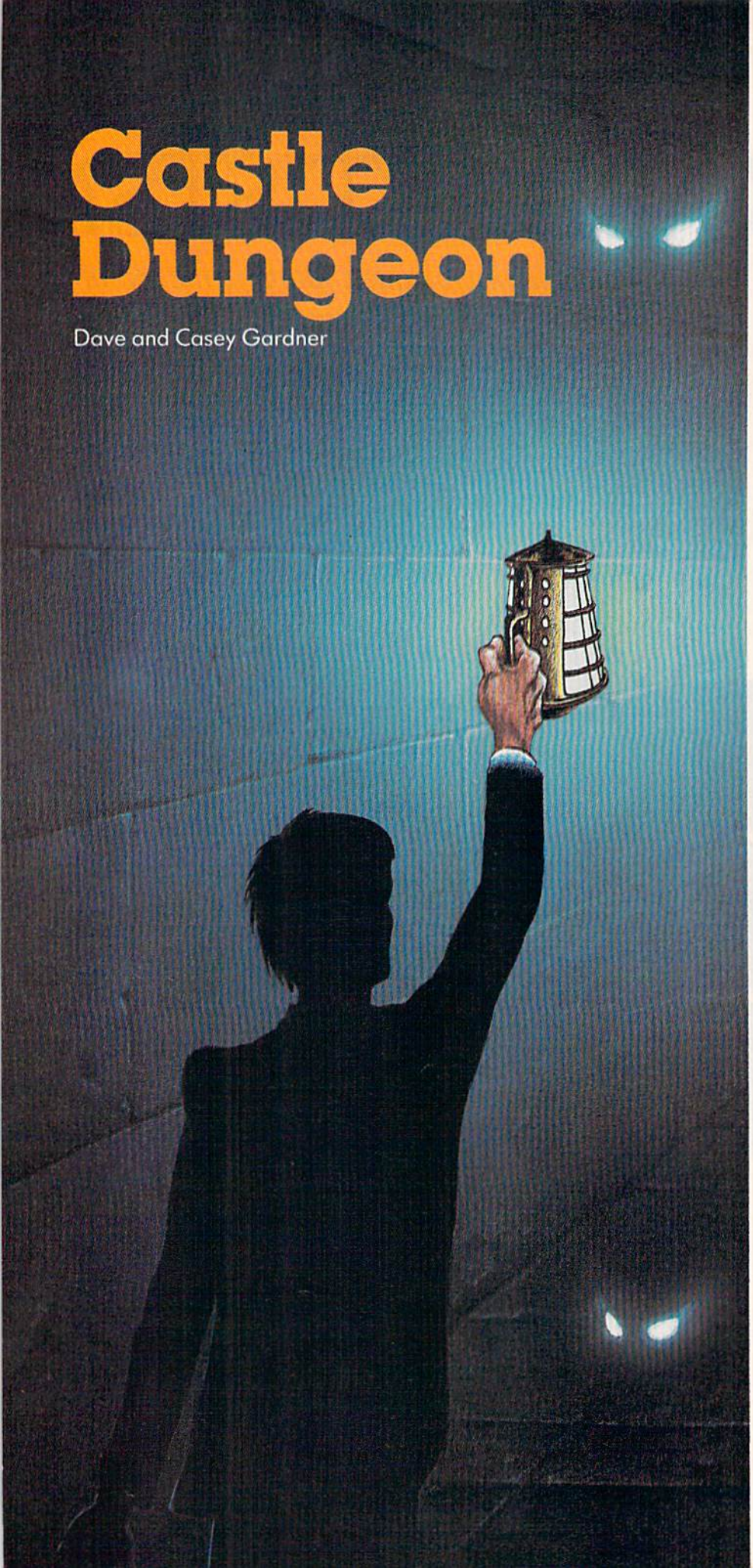


Julius Erving and Larry Bird Go One-on-One is now available on diskette for Apple II, II+, and IIe computers. Apple is a registered trademark of Apple Computer. To find out more about Electronic Arts and its products, write us at 2755 Campus Drive, San Mateo, CA 94403 or call (415) 571-7171. For a free catalog, send a stamped, self-addressed #10 envelope. Also available for the Commodore 64. Coming soon on IBM and Atari home computers.

ELECTRONIC ARTS™

Castle Dungeon

Dave and Casey Gardner



Bombs with short fuses and blind monsters add urgency and danger to this all-graphics adventure game for the unexpanded VIC and the Commodore 64. Joystick required.

Your quest is to find three bombs hidden in the rooms and corridors of the castle dungeon. They were placed by the evil wizard who is trying to destroy the castle.

He also put nine beasts in the rooms to guard the bombs. Luckily for you, the beasts are blind and will attack only if you bump into them. If you are carrying the enchanted sword when you fight the beasts, you can defeat them. You will also need the magic key to open the locked doors.

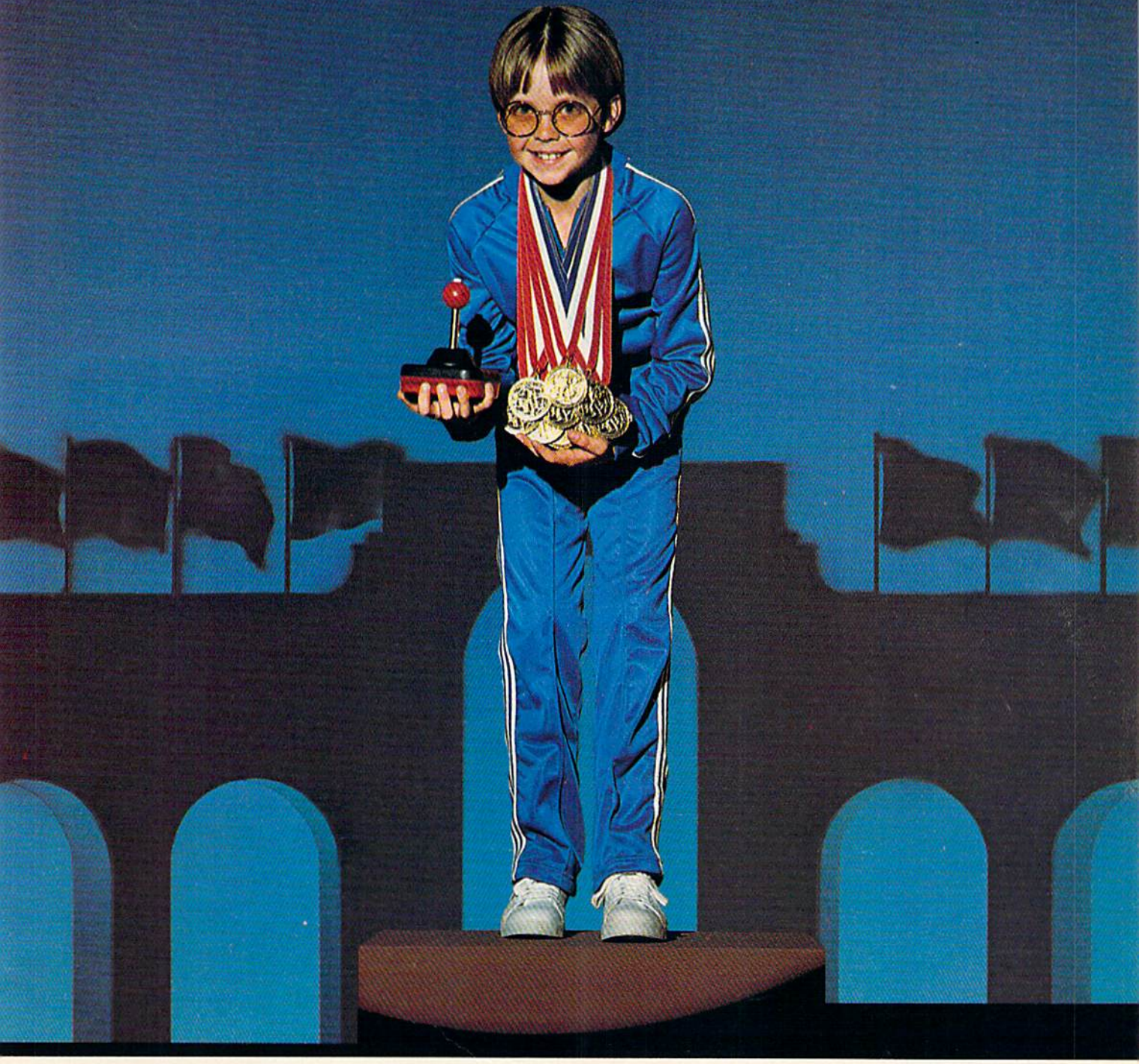
A Light And Levitation

On your search through the dungeon you will be carrying a light which is only bright enough for you to see the area immediately around you. If you move too fast, you might fall into a bottomless pit and be lost forever. By standing next to a pit and pressing the L key, you can invoke a levitation spell which will allow you to cross over the pit without falling in.

The fuses on the bombs will burn for only five minutes (three minutes for the 64 version). If you haven't found all three by that time, they will explode and the castle will be destroyed. Each time you play, the wizard will place the various objects in different locations.

To save memory, the VIC version of the program is in two parts. The first part (Program 1) displays the title page and instructions and defines the programmable characters used in the second part.

SUMMER GAMES.™
WHY WATCH THE OLYMPICS WHEN YOU CAN BE IN THEM?



You're an Olympic athlete competing in eight key events at the Summer Games. How well can you score in track, swimming, diving, shooting, gymnastics and more? So realistic, there's even an opening ceremony and awards presentation after each event.

Unlike other "Olympics-Like" games, Summer Games has incredible realism, superb state-of-the-art graphics and sound effects (including national anthems from 18 countries), and it is a true action-strategy game. In each event you must plan and execute your game strategy in order to maximize your score. It is not just a matter of how fast you can move the joystick.

So change into your running shoes, grab your joystick and GO FOR THE GOLD!

One or more players; joystick controlled.

EPYX™ COMPUTER SOFTWARE

Strategy Games for the Action-Game Player

A Special Filename

Type in Program 1 and SAVE it. If you are using a Datassette change ,8 in line 28 of Program 1 to ,1.) Then type in Program 2 and SAVE it as "D".

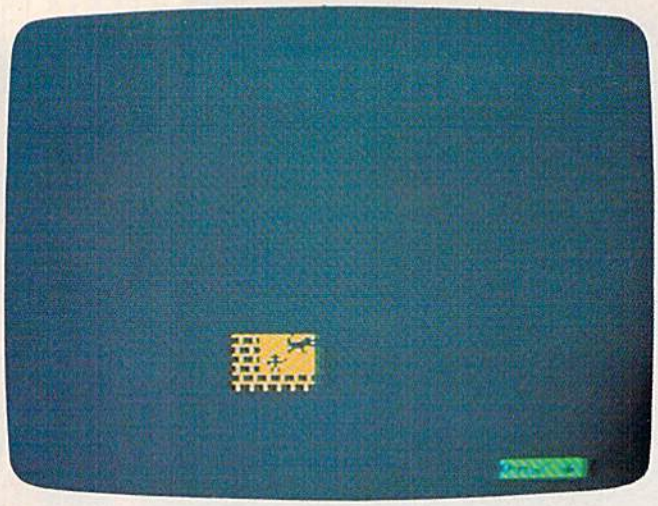
Here are outlines of the VIC programs:

Program 1 (VIC Loader)

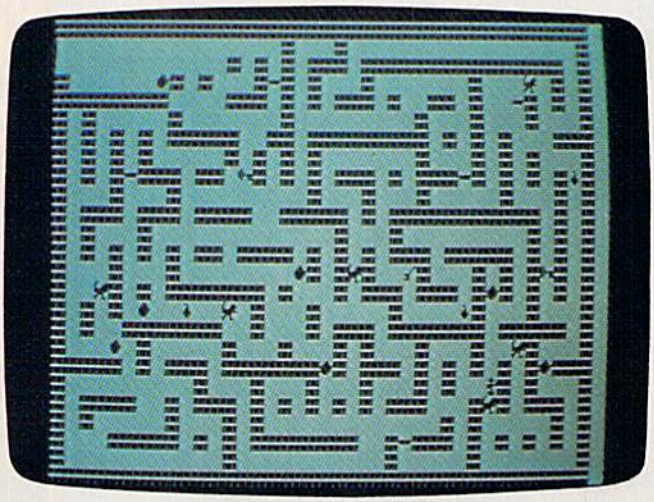
Line(s)	
1	Clears the screen and lowers the top of memory
2	Defines variables for sounds and the screen
3–5	Display the title page
6–7	Play a tune
8–10	Complete the title page
11–22	Display instructions
23	Randomizes (so each game will start differently)
24–25	Store character information in high memory
26–29	Start LOADing Part two
30–43	Title page DATA
44–49	Character DATA

Program 2 (Main VIC Program)

Line(s)	
1–2	Initialize variables
3	Fills the screen with black spaces
4–5	Place the maze
6	Places doors
7	Places room floors
8	Places bombs
9	Places beasts
10	Places key
11	Places sword
12	Places pits
13	Chooses starting point, sets the clock to zero
14	Reads joystick
15	Checks if time is up
16–20	Set direction
21	If wall in way—stop
22	Sword?
23	Beast?
24	Door and no key?
25	Key?
26	Levitation spell?
27	Pit and no spell?
28	Pit and spell?
29	Bomb?
30	If not moving jump ahead to Line 44
31–33	Light up area around player
34	If key or sword found—make sound
35	If player fell in pit—jump to ending sequence
36–37	If player levitated over pit—redraw pit
38	Cancels levitation spell
39	Makes player movement noise
40–43	Darken area just vacated
44	If third bomb found—jump to ending sequence
45	Do it again
46–47	Successful quest ending
48–55	Unsuccessful quest ending
56–62	Maze DATA
63	Door DATA
64–66	Room floor DATA
67–69	Subroutine for randomly placing objects
70–72	Sound subroutine for sword and key
73–74	Sound subroutine for locked door
75	Sound subroutine for bomb found
76–77	Sound and ending subroutine for falling in pit
78–81	Subroutine for fighting beast
82	Sound subroutine for levitation spell



The dungeon is dark and you've encountered a monster (VIC version).



If you lose, the maze is revealed (64 version).

We would like to thank Don Brunner and Todd Andrews of Rose City Computer Associates, Newark, New York, for their technical assistance in preparing this program.

The joystick reading routine is from "The Joystick Connection" by Paul Bupp and Stephen Drop (COMPUTE! magazine, May 1982).

If you would like to save the trouble of typing in and debugging the programs (VIC version only) send $3, a blank tape, and a stamped, self-addressed mailer to:

Dave Gardner
2342 Barnes Road
Walworth, NY 14568

See program listings on page 157.

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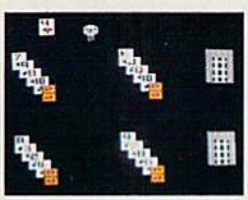
PUZZLEPANIC™
KEN USTON THINKS HE CAN DRIVE YOU CRAZY.



So you think there's no puzzle too tough for you and no video game you can't beat. Welcome to PuzzlePanic—The computer game that's sure to have you crying "uncle." Designed by Ken Uston, blackjack and arcade game player extraordinaire, PuzzlePanic takes you through 49 increasingly difficult screens based on seven different games of action, logic, strategy and challenge. Compared to PuzzlePanic, Rubik's Cube™ is child's play. So put on your thinking hat, grab your joystick, get ready for the contest of your life, and let Ken Uston drive you crazy.

One player; joystick controlled.

EPYX™ COMPUTER SOFTWARE

Strategy Games for the Action-Game Player

Revenge Of Cyon

Mike Reinman

Save Earth from the invading Cyon ships. Originally written for the VIC-20, we've added a version for the 64. A joystick is required.

"Revenge Of Cyon" is an action game for the VIC and 64 in which you try to save Earth from the invading Cyon Empire. Using the joystick, you must intercept the Cyon ships before they reach the ground. Do this by moving the cross hairs over each ship and pressing the fire button. You are given seven shots at each ship. When a ship is destroyed, the number of shots used and the number of seconds you took to get it will be displayed.

At first, the ships descend one at a time. But after the first six ships, the Cyons get smarter and send down two ships at one time. If you clear 11 screens, Earth is saved and you win the game. If the ships reach the ground three times, Earth will be destroyed and you will be rated on your performance. Six difficulty levels are available, ranging from simple to impossible.

A point of interest to beginning programmers is that FOR-NEXT loops will execute much faster if you omit the variable in the NEXT command.

See program listings on page 161.

It took two shots and four seconds for a direct hit in the VIC version of "Revenge of Cyon."

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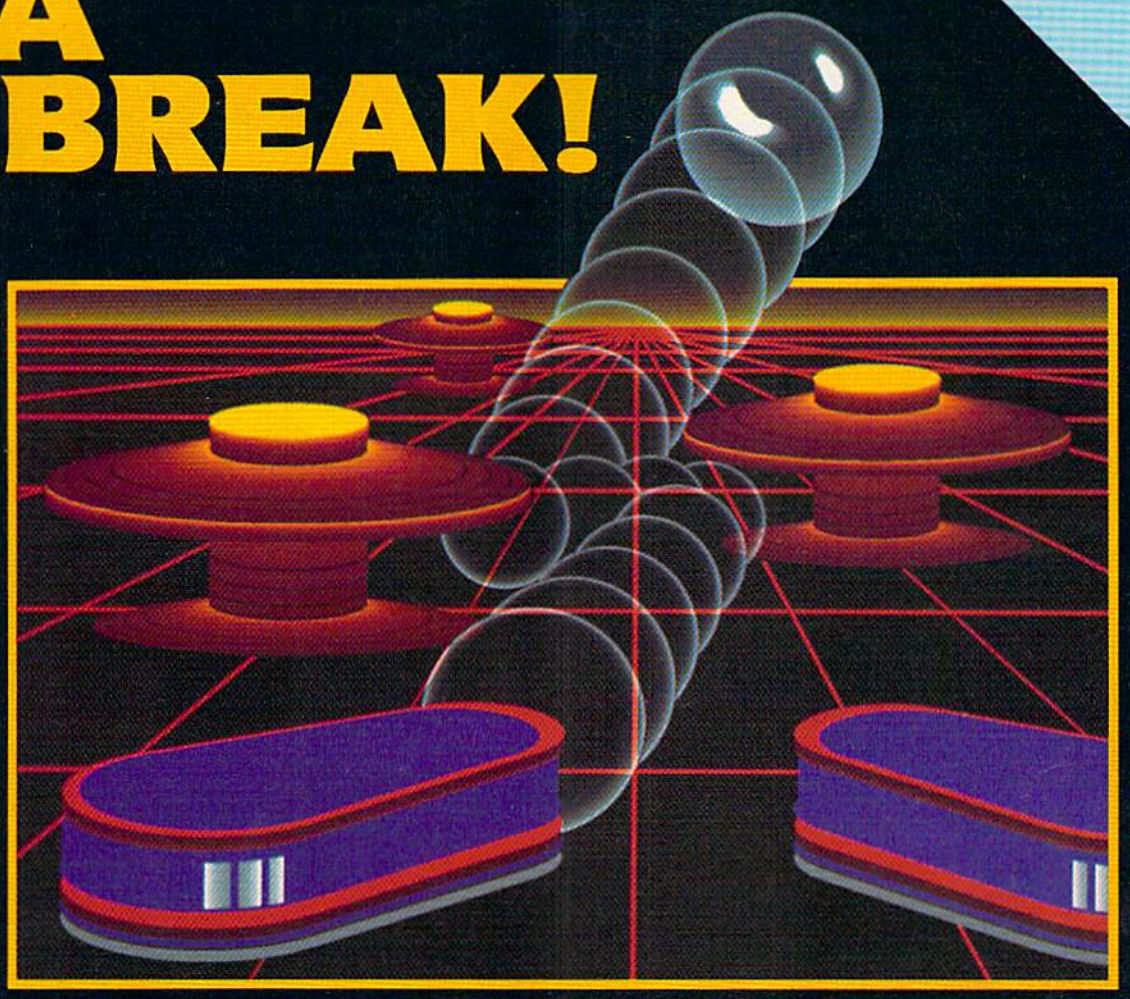
TAKE A BREAK!

For Commodore 64



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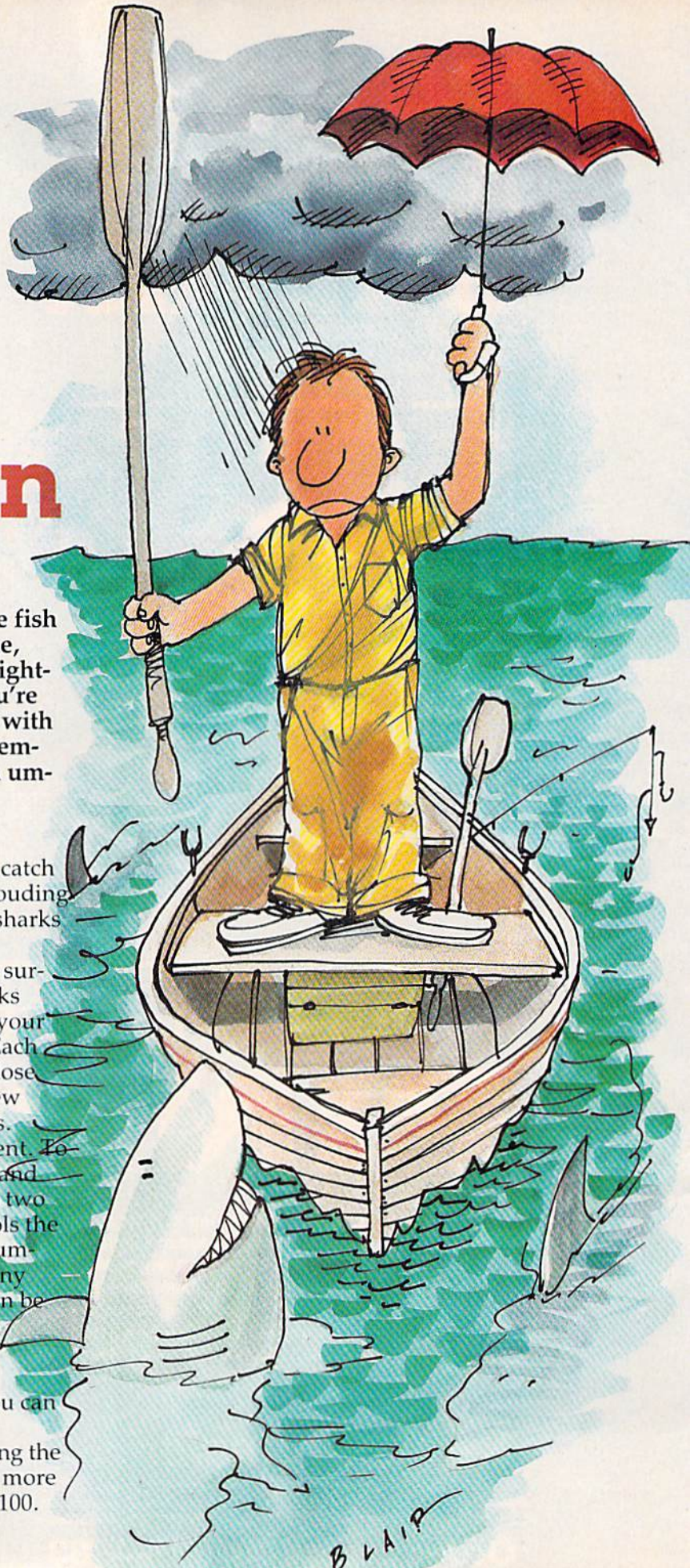
The Frantic Fisherman

David Lacey



Idly floating in your boat, waiting for the fish to bite, is a fine way to relax. In this game, however, an angler's dream becomes a nightmare when sharks get the notion that you're the bait and thunderclouds threaten you with gargantuan raindrops. It's good you remembered to bring your shark swatter and an umbrella. For the VIC and 64.

The fish are biting, and you've managed to catch a few. But suddenly you notice the sky is clouding over, and to make things worse, ravenous sharks begin to circle your boat.

The object of "Frantic Fisherman" is to survive. You score points by clubbing the sharks with your bat and blocking raindrops with your umbrella. You start with three fishermen. Each time a shark or raindrop hits the boat, you lose the boat and one fisherman. However, a new fisherman is awarded for every 2,000 points.

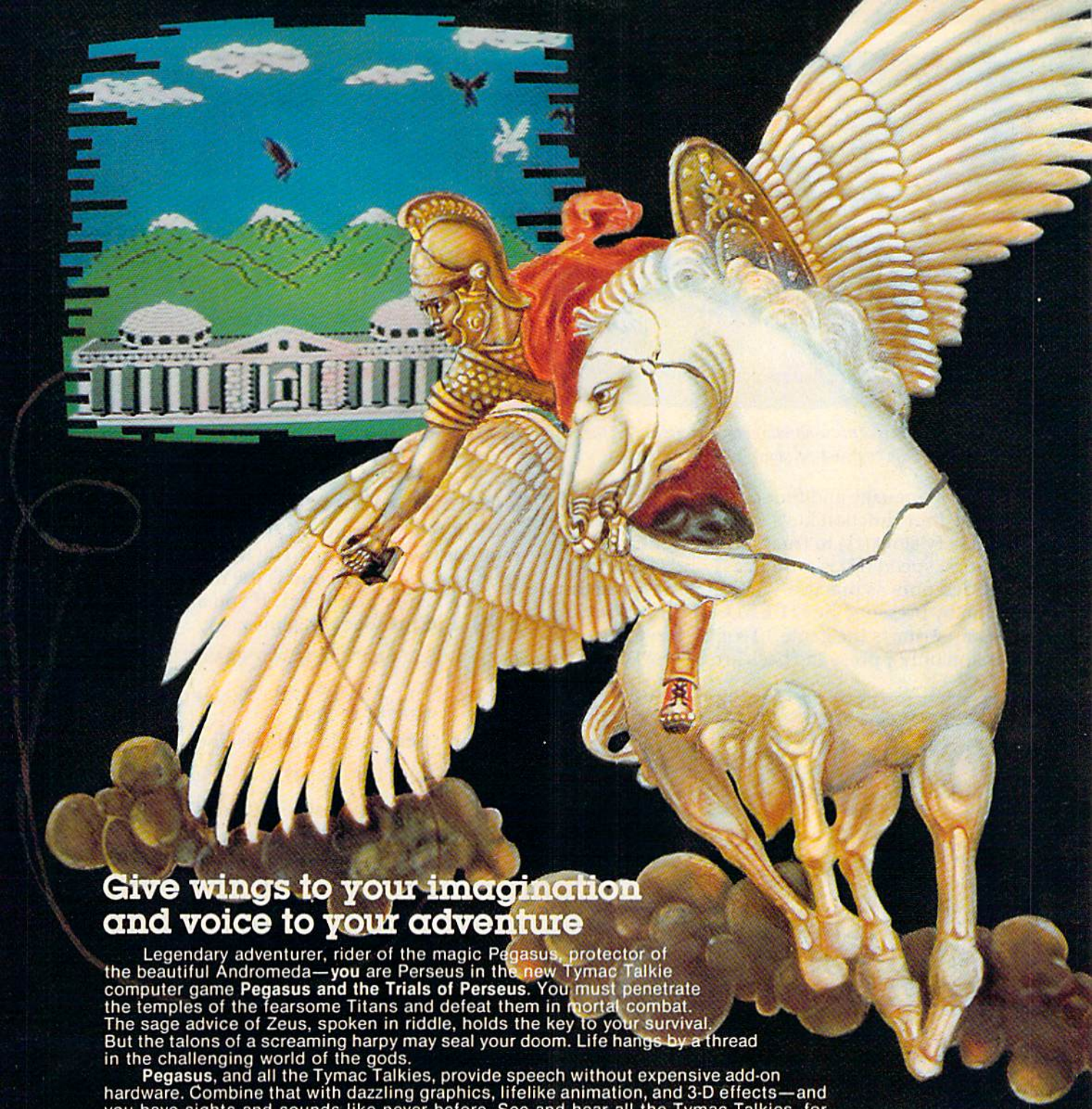
Three keys are used to control movement. To move back and forth, use the less than (<) and greater than (>) keys. The space bar serves two functions. When sharks approach, it controls the club. If a raindrop is falling, it controls the umbrella. You can use the shark swatter as many times as you like. The umbrella, though, can be lifted only three times for each raindrop.

Controlling The Frenzy

If you think the game is too fast or slow, you can make the fisherman more (or less) frantic.

VIC users can alter the speed by changing the variable DE in line 30 of Program 2. To add more fishermen, increase the value of GL in line 100.

The bulk of the 64 version is written in



Give wings to your imagination and voice to your adventure

Legendary adventurer, rider of the magic Pegasus, protector of the beautiful Andromeda—**you** are Perseus in the new Tymac Talkie computer game **Pegasus and the Trials of Perseus**. You must penetrate the temples of the fearsome Titans and defeat them in mortal combat. The sage advice of Zeus, spoken in riddle, holds the key to your survival. But the talons of a screaming harpy may seal your doom. Life hangs by a thread in the challenging world of the gods.

Pegasus, and all the Tymac Talkies, provide speech without expensive add-on hardware. Combine that with dazzling graphics, lifelike animation, and 3-D effects—and you have sights and sounds like never before. See and hear all the Tymac Talkies, for the Commodore 64,™ VIC 20,™ Atari® Home Computers, IBM PC or PC Jr. at your local computer retailer.

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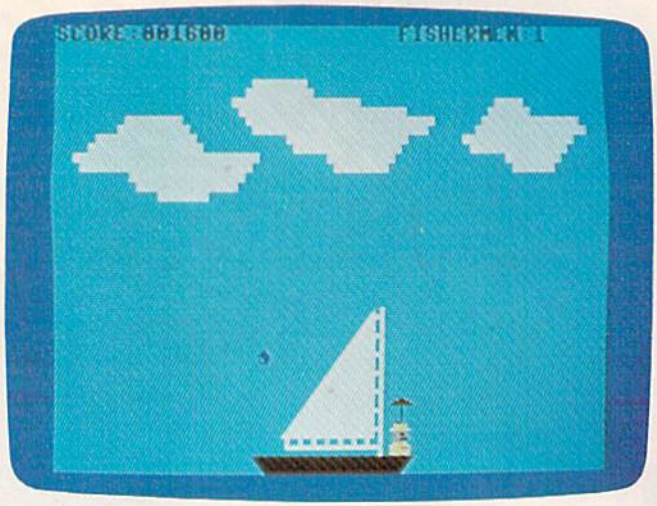

The fisherman raises his umbrella, but is standing on the wrong side of the boat (64 version).

In the VIC version, a shark is about to be bopped.

machine language and the speed controls are built-in. The four function keys give you four speeds, from very slow (f1) to frustratingly frantic (f7). The first speed (f1) is rather easy and is recommended only as practice. You can also pause the action by pressing the SHIFT/LOCK key. (Pressing it again restarts the game.) To end the game (64 version only), press the back arrow (←) key.

Special VIC Instructions

The VIC version runs on an unexpanded VIC, but requires two programs. The first redefines the character set, the second is the main program.

First enter Program 1. If you are using a disk drive, add the following lines:

```
700 PRINT"LOAD"CHR$(34)"FRANTIC2"CHR$(34)
    ",8"
710 POKE198,4:FORT=631TO633:POKET,145:NEX
    T:POKE634,13:END
```

Cassette users should add this line:

```
700 POKE198,1:POKE531,131:END
```

Next, type in Program 2 and SAVE it as FRANTIC2. To play the game, LOAD and RUN Program 1 and it will LOAD and RUN Program 2.

If you don't want to type in the programs, send me $3, a cassette, and a self-addressed stamped mailer, and I will make a copy (VIC version only).

David Lacey
3708 J Street
Lincoln, NE 68510

See program listings on page 182.

STOP PLAYING GAMES

NEW Disk Commodore 64

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- SCIENTIFICALLY DERIVED SYSTEM really works. TV Station WLKY of Louisville, Kentucky used this system to predict the odds of the 1980 Kentucky Derby. See *Popular Computing* (February, 1984) for a review of this program. This system was written and used by computer experts and is now being made available to home computer owners. This method is based on storing data from a large number of races on a high speed, large scale computer. 23 factors taken from the "Daily Racing Form" were then analyzed by the computer to see how they influenced race results. From these 23 facts, ten were found to be the most vital in determining winners. NUMERICAL PROBABILITIES of each of these 10 factors were then computed and this forms the basis of this REVOLUTIONARY NEW PROGRAM.
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REVIEWS

Arcade-Style Games For The VIC-20: *Skramble!* And *Gridder*

Harvey B. Herman, Associate Editor

What makes a great computer game? I suppose it's like investing in the stock market. If the brokers had all the answers, they would be millionaires investing their own money rather than other people's. And if game designers knew all the secrets for producing great games, they would never make a false step.

Since no one can know *all* the secrets, some people consistently do better than average in the stock market, and so do some game designers in competition for our software dollars. I don't know what a good average might be, but in the opinion of my family, Microdigital is batting .500 on *Skramble!* and *Gridder*.

My youngest son almost immediately formed strong opinions on the quality of each game. Perhaps you can use his insight in your evaluations of other games. However, we don't have all the answers, or we would be writing games rather than reviewing them.

Skramble!

The game begins with instructions and a chorus of "Yankee Doodle." You are in command of a moving spaceship. Your only options are to bomb, shoot, or maneuver around enemy defenses. You have a limited amount of fuel, not enough to complete the mission. You have to earn additional fuel by destroying enemy oil tanks. Points are scored by destroying their rockets and helicopters. You lose if you collide with anything or run out of fuel. Points and remaining fuel are displayed in a panel at the bottom of the screen.

There is plenty of variety—the game offers eight different challenges (screens) before you reach the Homing Slot. The first screen has varying terrain filled with storage tanks, rockets, and helicopters. With the joystick, you maneuver up and down, forward and back; and you bomb and shoot with the fire button. At first it seems easy, but then the rockets are launched and the subsequent screens become much tougher.

As far as my kids are concerned, this game is a real winner. The variety and level of difficulty keep their interest much longer than the average game. They keep coming back to it, but still haven't made it to the end. Perhaps therein lies the secret of a successful game.

However, I would not have predicted this from my first impressions. Although they may feel differently next year, they like it now and are still trying to reach the Homing Slot.

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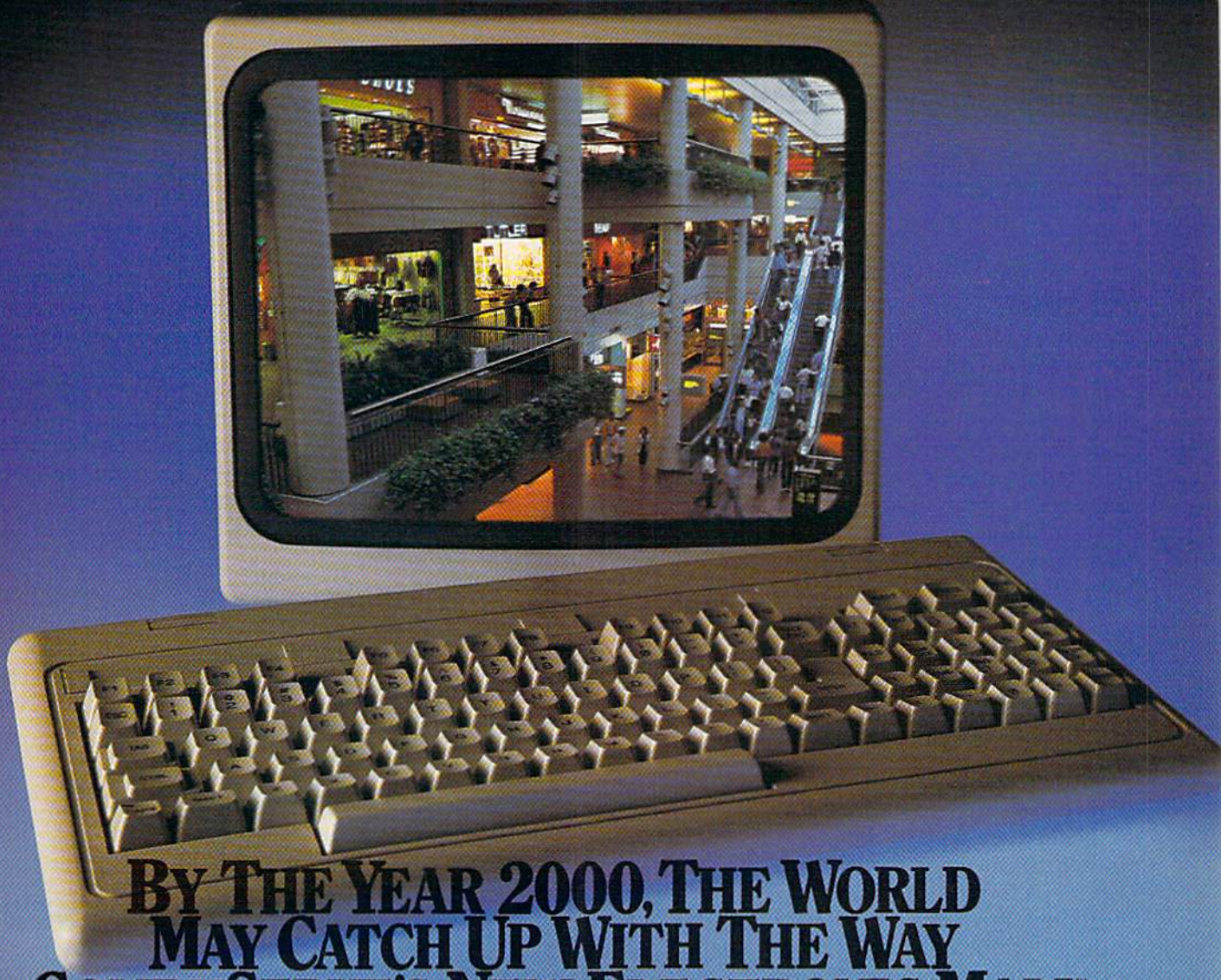

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Gridder

A painter, indicated by a happy face, is moved around a square grid. When he boxes a given square, it is painted (indicated by changing color). At the same time, lethal chasers are after the painter. The painter—controlled by your joystick—must paint all the squares on the screen without getting caught by a chaser.

The next grid appears when the previous one is painted; there are 256 different grids (screens) in all. The score, including current high, is shown at the screen bottom.

A few complications are offered. You may create holes in the grid which neither the painter nor the chaser can cross. This stops the chaser for only a short time, however. The chasers ordinarily cannot see through obstacles, but at higher screens the obstacles are transparent, which increases the challenge.

You get three extra painters in addition to the unused ones when a grid is completely painted. Up to nine painters are allowed at one time.

My youngest son reacted negatively to this game. He feels that there is not enough variety in spite of the 256 grids. In his words, "terminal boredom" set in long before the game became more difficult at the higher grids. Almost every other game was at least fun at first; not this one, he claims. Again, I would not have predicted this response from my first impression of the program.

For The Unexpanded VIC

Skramble and *Gridder* are offered on tape for the unexpanded VIC, and have the option of either keyboard or joystick play. The front of each box has an artist's conception of the game (poetic license as usual), but the back has a small photograph of the actual screen. I applaud this last step and wish more software packaging was this honest.

The question remains: Why did my children like one program so much and not the other? *Skramble!* was fun for us and *Gridder* was not. Your experience may be different.

The common thread of good games is true variety and challenge. They must hold your interest by offering sufficiently different situations. At the same time, they must challenge even the best players so winning will not be routine.

If a game meets the twin requirements of variety and challenge for you, by all means buy it. As always, I recommend that prospective buyers first try games at a local store.

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Easy Script: Word Processor For The 64

Shelby Neely

Easy Script, from Commodore, contains all of the standard word processing features: the ability to relocate or duplicate paragraphs, store files on disk or tape, and move easily around the screen using the cursor control keys. You can also jump to the top or bottom of the screen or your text, to the bottom of the file, to the next or previous word, or to any line, and to the next screen. In addition, you can pan in any direction.

Easy Script allows you to directly insert text while the rest of your document wraps around and realigns itself automatically. Likewise, you can delete characters, words, lines, and paragraphs. You can also erase words, characters, lines, or all of your file. Erase differs from Delete in that it leaves space on the screen in place of the erased text.

Easy Script boasts another useful feature that is found in many, but not all, word processors. With only a few keystrokes, you can search for every occurrence of a word or phrase throughout your document and replace it with a different word or phrase.

It can also search through any linked files on the disk. Linked files are files with a special marker that tells the computer to connect them when you view or print them. Since any computer's memory limits the number of pages you can hold in one file, you may have to divide your school paper or your year-end report or your first novel into many different files or chapters. The ability to link those files can be very useful.

Special Features

The table of contents in the manual is eight pages. Contained within are a very large number of features. The major ones are:

1. decimal tabs that automatically align your columns of numbers,
2. soft hyphenation which lets the computer decide whether to hyphenate a word or not,
3. margin release which lets you temporarily override the margin setting,
4. conditional forced page which lets the computer decide if the remaining number of lines is too few to print on the current page,
5. automatic page numbering,
6. headings and footings, and
7. tab settings that are easy to set, easy to use, and easy to view; and can also be saved and recalled.

You can also change the color combinations of the screen, text, and border, include comment lines in your text that will appear on the screen but will not be printed, and easily change uppercase letters to lowercase and vice versa. You can specify the number of blank lines in the text without the space appearing on the screen. (This saves memory.)

You Get What You See

Easy Script offers a convenient feature which allows you to see what the printed document will look like. While the program is not 80-column compatible, it lets you scroll horizontally up to 240 columns on the screen. In the special View Mode, what you see is what you get. If you specify double spacing, you'll see it, and if you want the right margin justified, you'll

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see that, too, along with centered headings.

Many word processors require that you purchase a separate mailing list program if you wish to send a form letter to many different people, but *Easy Script* includes a mail-merge program. You type a list of names and addresses, create your form letter, and then sit back while the computer merges the two and prints your letters.

If you have a need for standardized forms, *Easy Script* can accommodate that, too. You can save several standard paragraphs as separate files and then insert them into your form letters or merge them all to create one document.

Very Few Weaknesses

As with everything else, *Easy Script* isn't perfect. The manual is only fair. While it explains most features in detail and includes exercises and recaps at every step, it is sometimes difficult to understand, even for an experienced user. The only part of the manual that is really well organized is the Reference Section. You should read it first.

In addition, it is unfortunate that *Easy Script* does not include a Quick Reference Card. You can create your own, but many word processing programs supply them and they are quite useful. Since *Easy Script* is not menu-driven (another drawback), there are many commands to remember.

It is also disturbing to see words at the ends of lines cut in half in the Edit Mode. Most word processors wrap the entire word around to the next line if it will not fit. *Easy Script* does this in the View Mode only. Unfortunately, the View Mode does not allow all the cursor movement and editing commands found in the Edit Mode. Preferably, these two modes should be combined. In the View Mode, you never know where you are, there is no page number indicator or even line or column indicator, and you have to learn a different set of cursor movement commands.

In spite of these weaknesses, *Easy Script* still rates near the top of the list of word processors for the Commodore 64. It's powerful, professional, and easy to use. And the price is reasonable.

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Worms? For The 64

Gregg Keizer, Assistant Book Editor

Worm training? The idea sounds ridiculous at first. Images of riding and roping worms momentarily cross your mind.

No, *Worms?* isn't really a game about training worms, but that's part of the process. Elements of connect-the-dots are hidden in the game, but *Worms?* isn't a children's game, nor an arcade game that moves at lightning speed. This game is hard to pin down, for it fits in no convenient category. It's not "just like *PacMan*" or "close to *Defender*." *Worms?* is *different*.

Mathematical Worms

David Maynard, game designer and programmer of *Worms?*, first came up with the idea after reading a Martin Gardner column in *Scientific American*. The column discussed the patterns of idealized mathematical worms and it gave Maynard ideas. The result is *Worms?*

A one- to four-player game, *Worms?* moves slowly at first, picking up momentum as each worm becomes better trained. The colors, graphics, and sounds are up to the usual high standards of Electronic Arts. But all this is secondary to the delight you find in just experiencing the game.

You're On Your Own

When you open the game package, you see a disk, a four-page instruction booklet, and a warning not to read the directions. That advice is well-taken.

After a rather long delay in waiting for the game to load, the screen shows the playing field, worm selections, and instructions on how to change the worm types. You have four worms and five worm types to choose from. Press the f5 key to select one of the four worms, the f3 key to change the worm type.

The four worms are color-coded as green, red, blue, and purple. The worm types are:

- NEW. This is the worm type you'll normally select when you play. It's untrained, and you're the trainer.
- AUTO. Similar to the NEW worm, this one is trained by the computer to make intelligent moves.

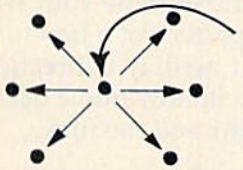
• WILD. Another computer-trained worm, it's programmed randomly before the game begins. Not as smart as the AUTO worm, it's easier to beat.

• SAME. The worm that played this color during the last game is used again. It's already trained.

• -----. The worm is dormant and doesn't play. Use this worm type to play with less than four players when you don't want the computer interfering.

The playing field, before you begin the game, is a screenful of dots. Each dot lies in the middle of its own territory, which extends to the six dots surrounding it.

Figure 1. Territories



The object of the game is to capture as many territories as possible by drawing worm trails from dot to dot. You capture a territory and receive one point when you draw the last trail in the territory. To win, accumulate more points than anyone else. It sounds terribly simple when you first read it, but it's not as easy as it sounds. Your worm may draw five of the six possible lines to a dot, and then another player's worm may come along and claim the territory. Or your worm may be laying trails in a perfect pattern, only to run into another worm.

Worm Trainer

As you play, train your worm to make specific moves in specific situations. It leaves a trail of light behind as it moves, drawing the

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lines from dot to dot. If you create a pattern that quickly draws lines and claims territories, you get points fast. If your worm's pattern is inefficient, it doesn't claim territories as quickly, and the other player's worms may capitalize on your work.

The space bar lets you choose the direction your worm moves in. Sometimes the directions are restricted because paths have already been filled in by your worm or other worms. When you're satisfied with the new direction, press any key to set the worm in motion and lay its trail.

The worm moves automatically once it recognizes a pattern in your training. It continues to move until it runs into an unknown situation. The worm then flashes and you are able to give it a new command. This process continues throughout the game. As you give more commands to the worm, you train it. It remembers all your previous directions and moves in that way as long as it recognizes the pattern. Training is a cumulative process. Eventually, your worm recognizes every situation, and you don't have to do anything but watch it move around the screen.

There are dangers to your worm, however. If two or more worms try to move to the same dot at the same time, they collide and die. You hear a nasty sound and see a small flash as your worm expires. Your worm dies if it cannot move from its present dot as well. This usually happens only near the end of the game when the screen is filled with trails and your worm's trapped.

Patterns And More Patterns

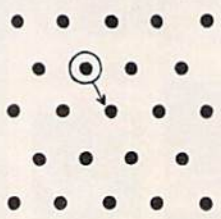
Creating a good pattern is one of the keys to the game. You'll find yourself training your worm to make all kinds of patterns, from girderlike constructions to zigzags to complex hexagon clusters. Many times, you'd like to duplicate a pattern you used in a previous game, but you can't because another worm is in the way. Each game is different from the last. You have to adapt to the situation.

It can be frustrating, especially when other players interfere with your worm's training, but that's part of the joy of *Worms?*. It's not all skill, however. Luck plays a part in the game. Imagining what your worm will do is almost impossible at times. Sometimes the only thing you can do is train your worm and see how it all works out. If you're lucky and the other player's worms happen to create patterns that yours can exploit, so much the better.

It's difficult to visualize how a worm is trained, and how patterns are created by just reading about it. Seeing is everything here.

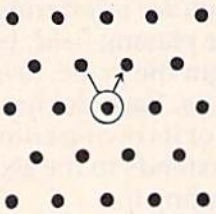
You're starting to train your worm, and want to create a pattern. How do you do it?

Figure 2. First Move



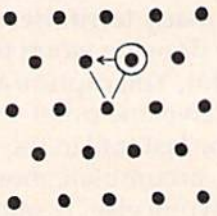
Your worm has six directions to choose from. You decide to move it southeast and press the space bar until that direction is indicated. The worm moves to the dot below and to the right. Now it wants another command, for it doesn't recognize the pattern of a trail leading from the northwest.

Figure 3. Second Move



You tell the worm to move northeast. Anytime your worm sees the pattern of a trail to the southeast, with five directions open, it will now move up and to the right—*all* the time.

Figure 4. Third Move



Now your worm moves west, closing in the triangle. You still haven't earned any points, however, since there is no dot with all six trails drawn to it. From now on, when your worm starts out on a dot which has one trail to the southwest (created in the second move), it will want to move to the west.

Your pattern is just beginning. As you continue to train your worm, the pattern will emerge. If you've trained your worm well, it will continue the

same pattern, over and over, until it either fills the screen or cannot move further, in which case it dies. Of course, playing with only one worm on the screen is considerably different than when there are four complex patterns developing from four worms.

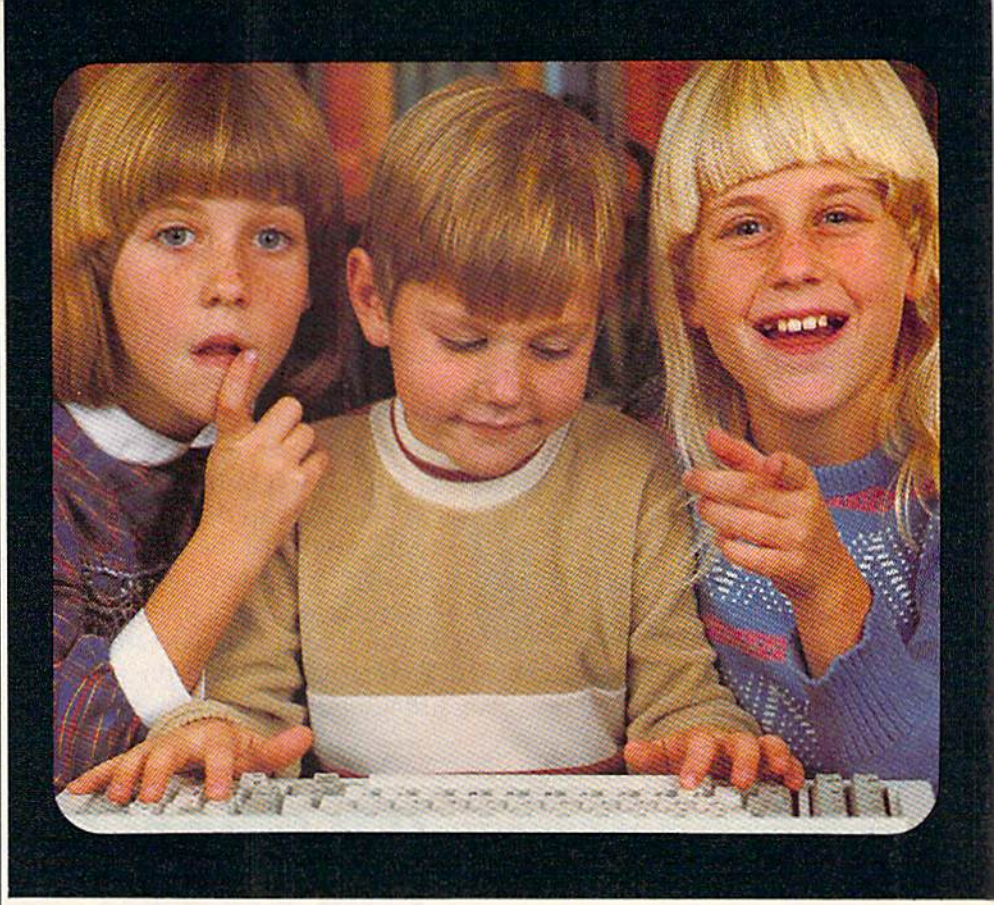
Other Options

There are several interesting options also included in *Worms?*. You can freeze the game's action at any time, turn off the grid's dots, flash claimed territories throughout the game, and even save and load previously trained worms. Changing saved worms is also easy to do. These options are useful if you want to analyze a particular worm's pattern to see how to improve it, or to stop in the middle of a game and resume it later.

Unique And Interesting

Worms? is one of the most fascinating games I've played in a long time. It's so different from anything else that it quickly captivated me. *Worms?* tournaments became popular among the staff of COMPUTE!. We soon had our favorite patterns and worms, from girders to vast encircling patterns that became apparent only after half the screen was filled.

The game is hard to master. It's easy to play, but seems almost impossible to play well time after time. There are just too many factors over which you have no control such as the other player's worms and peculiar patterns you may have inadvertently created. You can't really become an expert



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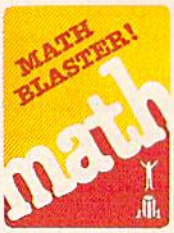

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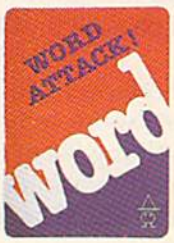

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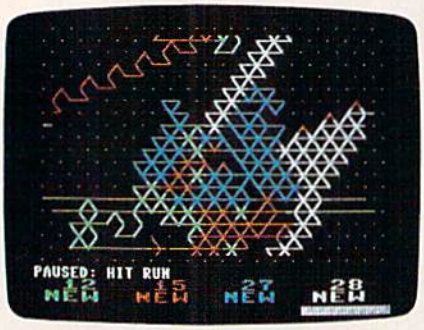

Train your worms well and you will capture more territory.

at this game in the same sense as you can with arcade games like *PacMan* or *Robotron*, where you practice the same system of movement and fire over and over. That's not to say this detracts from *Worms?*. Instead, I think it's one of the reasons we play the game so frequently. A novice can play and have an excellent chance of winning, even with only the briefest explanation of how the game works. Each game is different from the last, so even the most experienced players enjoy playing game after game.

Worms? is as much fun to watch as it is to play, and when your worm dies, you may stay in front of the screen just to see how it all turns out. At game's end, when the different patterns are revealed, along with the point totals, there will be oohs and ahs at the geometric precision or random inefficiencies of each worm.

Worms? is a strange game in a lot of ways. Even though it consists of lines and dots, you can be easily drawn into the game's world. Some arcade games do this with cute characters and elaborate animation. Neither of these is used in *Worms?*. Yet you *do* fall into the worm's mentality quickly, thinking about how to train your worm faster, or in better patterns. Sometimes the planning, such as it is, pays off; other times it doesn't because another player's worm interferes or crashes into yours.

Don't read the directions that come with the game. You probably won't understand them anyway. It's not a matter of clarity, but one of visualization. *Worms?* is almost impossible to imagine without seeing it on the screen and experiencing the game. Even when you've played the game for a time, reading the directions doesn't seem to help. There are just too many possibilities to explore. But you'll have fun trying.

Worms?
Electronic Arts
2755 Campus Drive
San Mateo, CA 94403
$40

IFR (Flight Simulator) For The VIC-20

David Florence, Programming Assistant

You are on the runway ready for takeoff. Throttle full, you begin to accelerate. Airspeed is rising—20, 30, 45, 53. You pull back on the stick and begin your ascent. You retract your landing gear. Heading 000-north, you are on your way. Now you are Charles Lindberg or Amelia Earhart.

You have entered the world of flight—a domain of mountain ranges, high and low altitude forests, canyon passes, and thin landing strips.

Academy Software's *IFR (Flight Simulator)*, written by Ron Wanttaja, joins a long list of other flight simulators for various computers. But, it stands apart in several ways.

First, it is written for the VIC-20. (A Commodore 64 version is also available.) Second, the instrument panel displays readings in digital form. This makes it easier to understand the status of your flight. Third, you can choose from ten levels of skill and turbulence. This adds to the challenge and enjoyment of test flights.

Getting Airborne

When you begin, you are prompted for a choice of skill level and air turbulence factor. It may be wise to set these at zero until you earn your wings.

The program contains a useful editor with which you can set your flight conditions. When you are prompted to press T for takeoff, you can press E instead, for the editor. Should you choose this, you can customize the flight conditions of altitude, north and west coordinates, airspeed, throttle, fuel, and heading.

Use the map to determine where you would like to be, and remember to set your airspeed above the stall speed or your flight will be a short one. The editor is more useful as you learn to control the aircraft.

To take your first flight, you need to increase throttle, (labeled T on the lower left of the screen) to full by pressing the f1 key until the indicator is fully lit. When your airspeed reaches about 50, gently pull back on the joystick to start your climb.

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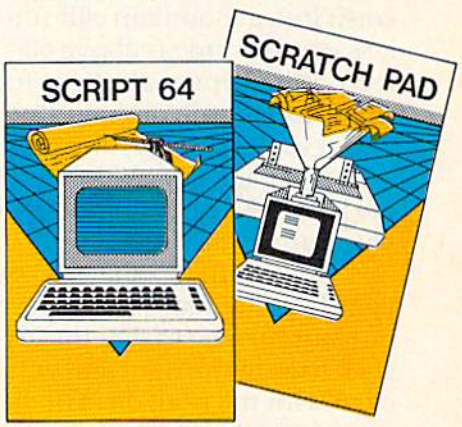

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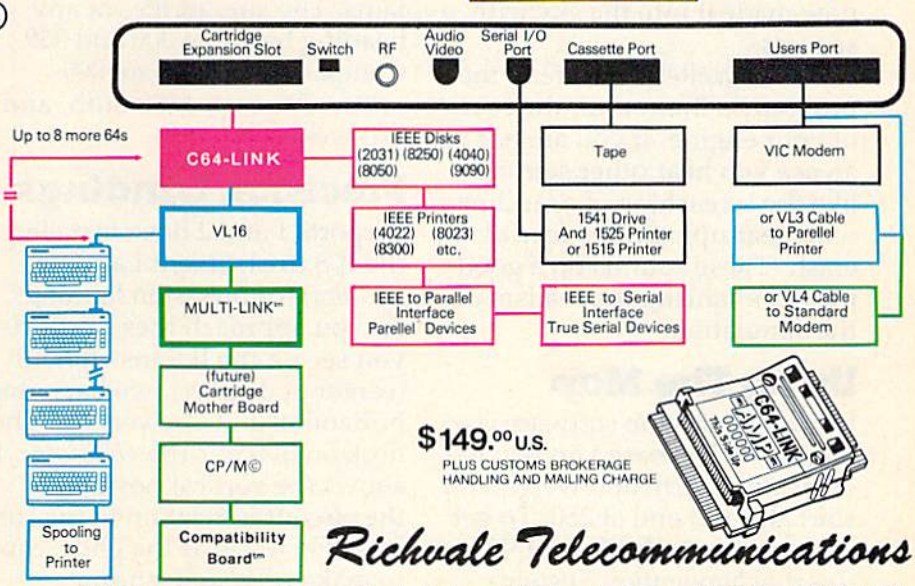

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When your altitude is above 80, you can pull up your landing gear by pressing G.

As the airspeed reaches about 105, pull back on the joystick a little more to level your speed. Your altitude starts to increase at a faster rate, and your north coordinates are increasing rapidly while your west coordinates are relatively stable.

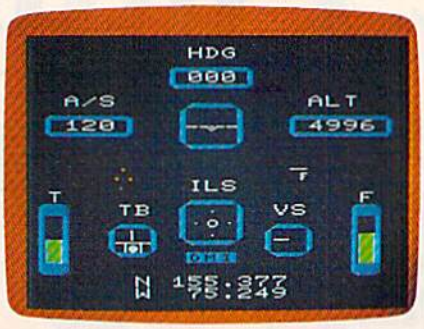
Begin a turn to the west, heading 270 (the compass is in the top center of the display), by moving the joystick to the left. Make the turn before your north coordinates reach 75, or you will crash into a mountain cliff (unless your altitude is above 600 feet). When you make your turn, the artificial horizon (middle center of the display) and your turn and bank coordinator (middle left of the display) reflect your turn to the west.

Don't turn too sharply. As your heading reaches 270, level off your turn by easing the joystick back to the right and getting even with the horizon. You have now made it into the sky with success.

An excellent feature of the program is the sound, the roar of your engine. If you are not yet an ace you hear other sounds like the screeching of a landing with gear up, and the fearful crash. These sounds do a good job of enhancing the realism of the simulation.

Using The Map

Included with the software is a map, which is based on two coordinates, north and west. Both start at 0 and end at 250. To get your position, check the INS (Inertial Navigation System) readout at the bottom of the display panel. Trace up the map's vertical axis until you reach the north value, then trace horizontally until you reach your west value. Where the two meet is your location on the map. Each unit on the INS readout is the equivalent of one-tenth of a mile.



Flying through the mountain pass in IFR Flight Simulator.

There are four airports, only two of which have fuel and repair. There are different altitudes and terrains, a mountain range and forests, as well as high and low passes through the mountains. The aircraft flies at any heading between 000 and 359. Compass headings are 000-north, 090-east, 180-south, and 270-west.

Precision Landings

Airports 1 and 2 have installed the ILS (Instrument Landing System) for precision landings. As you approach these airports, you see on the ILS instrument (center of display) two bars, one horizontal and one vertical. The horizontal bar is the *glidescope*. It shows the vertical position of the aircraft in relation to the runway. Fly towards the glidescope to make precision landings.

The vertical bar is the *localizer*. It shows the position of the aircraft relative to the center of the runway. There are front course and back course localizers. Fly towards the bar on the front course and away from the bar on the back course. Below the ILS instrument there are three indicators labeled O, M, and I, for outer, middle, and inner markers. They light at miles 3, 2, and 1 from the airports, respectively. These enable you to make very precise landings.

Helpful Hints

There are some things, not immediately apparent, that will help you make successful flights.

When taking off, be sure to keep your airspeed above the stall speed. Stall speed with flaps up is about 56 mph. If you hear a tone shortly after takeoff, it means that you are going up too fast for your airspeed, so bring the nose down a bit by pushing forward on the joystick.

Your landing gear is delicately balanced so it may not function normally if you are rapidly losing airspeed or altitude. Be sure to get the gear up and down while your indicators are relatively constant. A good time for gear up is just after leaving the ground, and a good time for gear down is just after making your turn towards the runway.

Fly the aircraft so that one of your coordinates is constant. This is difficult to do. You'll find that "crabbing," or flying a little to the left or right of your desired heading, helps immeasurably.

When flying at high altitudes, be sure to remember that a lot of fuel was burned to get that high. You may make it to the desired altitude, but you

could run out of fuel before you are able to get back down.

On the other hand, the aircraft needs limited fuel to make a descent, so if you have used a lot getting up, cut back the throttle to 0 or "dead stick" for your descent.

Should you run out of fuel, remember that it is still possible to land the aircraft. Also, if you are low on fuel, you may find it preferable to make a safe landing somewhere in the fields rather than waste what little fuel you have trying in vain to reach an airport. Fueled landings are more easily made than dead stick landings.

Land from the east and make a swift turn to the south after takeoff at Airport 4.

Use the nosewheel steering to get back on the runways should you run off. You won't need very much speed to taxi, so keep it slow, around 6 or 7 mph.

Your brakes work better if your throttle is at 0.

IFR (Flight Simulator) has a quality of realism which sets it apart from others of its kind, even those I have tested at a flight school. The controls in this program respond very much like actual aircraft controls. They are not overly sensitive, but give you what you ask for, even if it is flying right into a cliff.

This program does not serve as a substitute for real training, but it does familiarize you with some basic flight terminology and theory, and it's tremendous fun.

IFR (Flight Simulator)
Academy Software
P.O. Box 6277
San Rafael, CA 94303
VIC-20 cartridge $39.95
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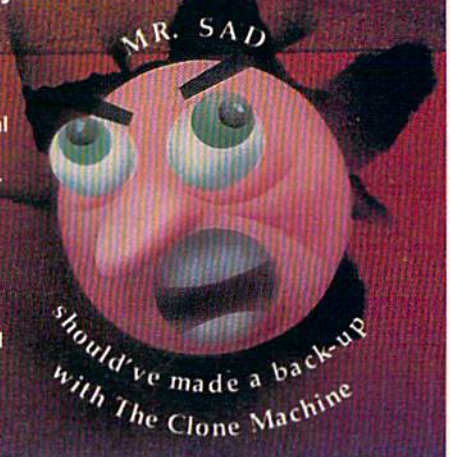

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New Standards In Home Learning

Part 2

Fred D'Ignazio, Associate Editor

Now that computers are going into the schools in record numbers, we are finally realizing that we have gone about things all wrong.

Before computers arrived in the schools, we should have laid some groundwork.

Parents need to be briefed. Teachers need to be trained. Schools need some way to purchase software, course materials, books, and magazines. Teachers need some guidelines for purchasing new computers, new software, new computer equipment and materials. Standards and procedures for product review and evaluation need to be agreed on.

Children need to be consulted.

Parent Training

The situation at home is even worse.

Computers are popping up by the millions at home. Parents who don't know anything about computers are running out and buying software, materials, and equipment based on dealer recommendations, the pictures on the software packages, and occasional reviews and recommendations they see in magazines and on television.

I think most parents are anxious and bewildered about computers. But they are also incredibly curious about what can be done. "How can my kids use this computer?" they are asking. "How can my kids use this computer to be happy and successful?" "What can my kids learn on this computer?" "*How* can my kids learn?" "How can this computer help my kids at home?" "How can it help them in their schoolwork, and prepare them for growing up?"

In school, people are finally realizing that teachers need in-service training in order to integrate computers fully into the schools.

And if teachers are getting training, why not parents?

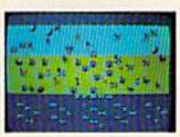
Courses should be set up for parents to attend. The courses should be jointly created by teachers, computer vendors, parents, and children. The courses should concentrate on training parents on how to use computers as home-learning tools.

Learning at *home* should be emphasized. Parents should not be taught to copy what teachers are doing at school. The situation is different at home. Parents should be given the information and skills they need to cope with the problems they face at home.

A parent-training curriculum might include the following areas:

- Which computers best lend themselves to home learning?
- What are the best home-learning programs?
- Which new kinds of computer equipment can help home learning—like touch pads, light pens, speech synthesizers, and keyboard overlays?
- What materials should come with software to help guide parents and to supplement computer learning?
- What are some basic guidelines to help parents evaluate home-learning software and materials?

follow our path to the future of home computing.



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- Which publications, catalogs, etc., bring the best new equipment, software, and materials to parents' attention?
- What techniques should parents use to actually *shop* for and *purchase* home-learning materials?
- What are the best local stores—in terms of service, hand holding, training, and dealer support? What are the stores with the nicest, gentlest salespeople—people who like and understand children and who know how to talk in English?
- How can parents set up "user groups" of fellow parents who are interested in teaching preschoolers, elementary-age children, or secondary-age children, or handicapped or learning-disabled children, or children who need help in science, social studies, language arts, math, reading, or writing, or kids who are talented or gifted?

Learning By Surprise

Thanks to the computer, learning at home will soon be as important as learning at school. But it can't replace school. Nor should it try.

Computer learning at home should reinforce, complement, and supplement classroom-based education. Parents and teachers should work closely together to make sure that the mix of home and school learning is the most efficient mix possible and in the best interest of their children. Coordination is crucial.

The debate on home learning using computers has just begun. Most of the important subjects haven't even been covered—or discovered.

Education at school can receive important, surprising boosts from home computers. For example, let's say a child is having trouble with social studies at school. The child has the aptitude for the subject but is utterly bored by the material. Boredom and lack of interest are reflected in the child's grades and behavior in the classroom.

The parents could strap the child to a desk every night and require doing extra lessons and more time studying the boring textbook. Or they could purchase some of the new "social studies simulations" software. The software might turn the child into a cartographer to map out a newly discovered continent, or a population planner, or an advisor to President Lincoln during the Civil War.

The most important thing the software could do for the child is *bring the subject to life.* It could awaken the child's interest and bring an excitement to the subject which could transform the child's whole attitude and performance in the classroom.

Sharing Your Experiences

In upcoming columns I hope to explore some of the new dimensions of computer learning that *take us by surprise.*

Also, I'd like to hear from you. If you or your children have learned from the computer in some novel, unexpected way, please share your experience with me. Write:

Fred D'Ignazio
2117 Carter Road, SW
Roanoke, VA 24015

To demonstrate that there are new, unexplored dimensions of computer learning, I am gathering stories and experiences for future publication in my various columns. I would love to hear from you!

Learning As Entertainment

Before you write me, I'd like you to think about something else, too. Then maybe you'll share your thoughts with me.

I think that computer learning at home may soon cease to be called "learning." Instead, we might end up putting it under the category of *entertainment.*

Think about it. The words *education* and *learning,* for many adults and children, have a negative connotation. For them, the experience of learning is associated with pain, embarrassment, tedium, and boredom.

Computer learning often isn't any different. But it can be.

Computer learning can be made so pleasurable, so joyous, and so rewarding that it may slip unnoticed into the category of "entertainment." It may become a new form of entertainment that feels good to a person at the same time it benefits and changes him or her in a substantial way.

If home-learning programs are designed with enough imagination, subtlety, and respect for people, they may soon become more popular than videogames were in their heyday. Families will gather around the computer, like an "electronic hearth." Instead of watching TV, they will spend many active, enjoyable hours together every evening learning new things on their computer.

And they won't think of it as work, learning, or education. They will think of it as entertainment.

Learning As Expression

In one of my recent columns ("The New King Of The Mountain" in the February GAZETTE) I showed examples of how computers can boost a person's abilities in art. The person in my article was my four-year-old son Eric, and I wrote about the amazing things he was able to do using the *KoalaPainter* art program and the KoalaPad touch tablet.

Computers can open new doors into areas of

self-expression we never knew existed.

New programs like *Music Construction Set*, *Micro Illustrator*, *MusiCalc*, *Delta Music*, *Fun Writer*, and *Word Vision*, allow us to express ourselves in colors, shapes, and designs, in words, and in music.

And we can start creating the moment we sit down at the computer!

Gone are the hours of manual-reading just to learn how to use the computer. Gone are the additional hours needed to master the technical complexities of drawing, sight-reading musical scores, composing, or typing on a standard typewriter.

With the right software, the computer can act as a booster and an amplifier for our skills and can enable us to directly tap our imagination and produce new creations in various media.

Most of us, by the time we become adults, walk around with a little "editor" inside our heads. Whenever we do anything the editor reminds us that we are either good or bad at that thing. It tells us whether we are knowledgeable or ignorant, skilled or unskilled. It assesses our past efforts and predicts whether our performance will be graceful or awkward, and whether the results will be elegant or ugly.

We pay close attention to our editor. Listening to the editor keeps us from making fools of ourselves in new situations. For example, by the time we are adults, if we haven't become accomplished musicians, writers, or artists, we shy away from these areas. We do not casually sit down with guitars, typewriters, or paintbrushes. We know how bad we'd look, and the kind of trash we'd produce. We know because our editor tells us.

But now we have a way of disabling that editor and, simultaneously, of being able to produce works of art that are beautiful and *personally satisfying*. We can do all this by using new kinds of computer tools.

Just The Beginning

But expressing ourselves is just the beginning. These programs should also act as a stimulus to get people learning more about the discipline of music, the discipline of art, and the discipline of writing.

New programs should pick up where these programs leave off. They should be more than "builder kits" and "construction sets." They should challenge us to a higher level of achievement in each of these disciplines, while rewarding us with beautiful creations along the way.

And why do we have to have construction sets for the arts?

Why don't we see mathematics construction sets, physics construction sets, chemistry construction sets, and biology construction sets?

How would you like to build a budding rose, design a working star, or construct an erupting volcano? How would you like to create a *working* model of the human heart? Or construct a gene, a DNA molecule, a bacterium, or a one-celled amoeba then bring it to life?

The delight and thrill you'd feel wouldn't come just from the intellectual experience of building a computer model of a heart, an amoeba, or a volcano. It would come from creating a beautiful, emotionally satisfying work of *art*—like creating a pretty picture or a moving piece of music.

The computer's greatest value as a learning tool comes when it mixes process and product, when it blends the technical and scientific with the artistic, and when it frees us of inhibitions and taps our imagination, yet still challenges us to acquire more skill and do better.

Learning by surprise, learning through entertainment, and learning by expression are some of the ways computers can help people learn. They are ingredients for profound and permanent learning. These ingredients and many more, as yet undiscovered, should be present when we use computers to learn at home. They should be included in new standards for computer-based home learning.

My thanks to the many industry watchers who, through discussions during the recent Consumer Electronics Show, helped contribute to the ideas in this article.

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Therapy

Steven Rubio

It'll never replace Freud, but "Therapy" may just cure your blues. For the expanded VIC-20 and Commodore 64.

"Eliza," the computer psychotherapist, is probably the most famous of all programs dealing with artificial intelligence. Written in LISP by Joseph Weizenbaum in 1966, Eliza has run on computers of all sizes and types, including home computers programmed in BASIC, in the ensuing years.

There is something fascinating about carrying on a seemingly reasonable conversation with a machine. I still remember the thrill when I first learned my VIC could ask me a question (what is your name?) and remember the answer. This thrill is what prompted me to write "Therapy."

A Smarter Therapist

Why another version of Eliza? Mainly because when written in BASIC, Eliza is extremely slow, taking as much as ten seconds to respond to your comments. It seemed to me that for a therapist, Eliza was a bit stand-offish; and rather dumb, besides.

The problem in BASIC is that Eliza tries for too much. Searches of fifty keywords and a hundred responses slow Eliza down; and in its attempt to give meaningful comments to *all* the user's statements, it consumes a lot of time for only occasional, if spectacular, success. The off-the-wall pronouncements of Eliza often elicit laughter and vexation.

This is all right, since Weizenbaum never intended the program to substitute for actual therapy. But when showing off your computer to friends at your next get-together, it might be fun to have a program to demonstrate your machine's "intelligence."

Program 1 is Therapy for the 64. Program 2 is the VIC version, which requires memory expansion. Any amount of expansion (3K, 8K, etc.) will work.

I would be glad to hear from any of you regarding this program, or any similar ones you may have written. I can be reached on CompuServe, user ID #74105,1477.

See program listings on page 163.

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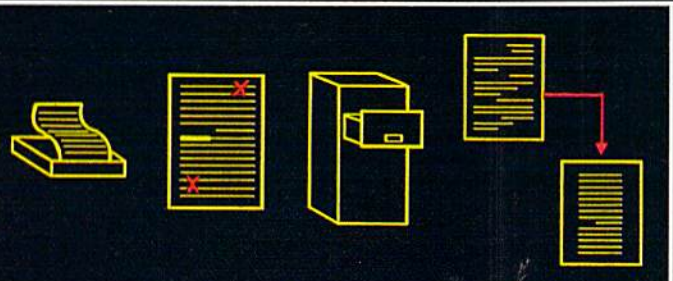

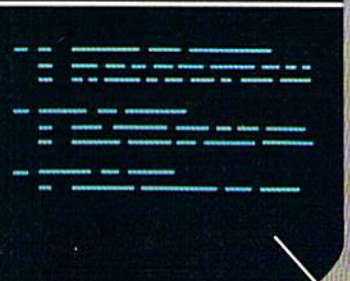

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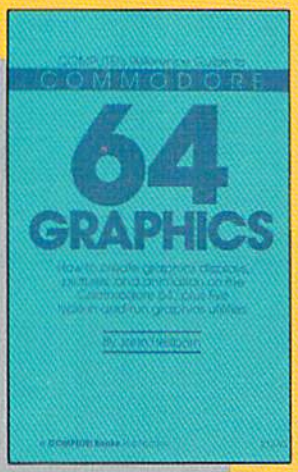

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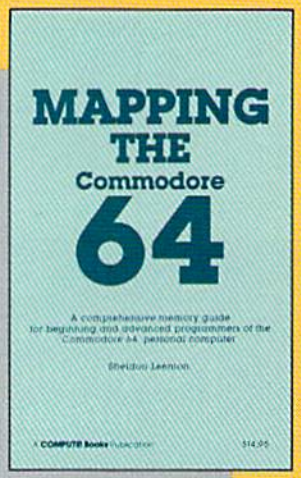

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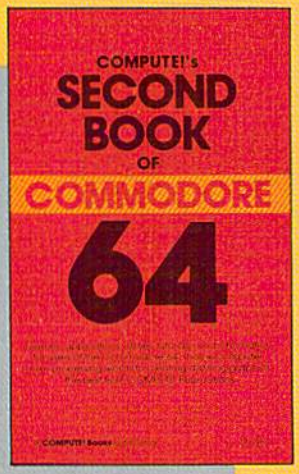

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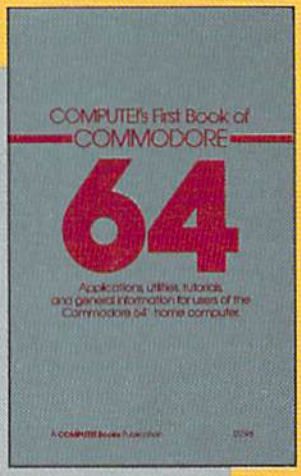

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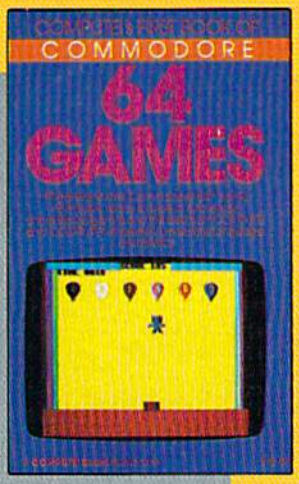

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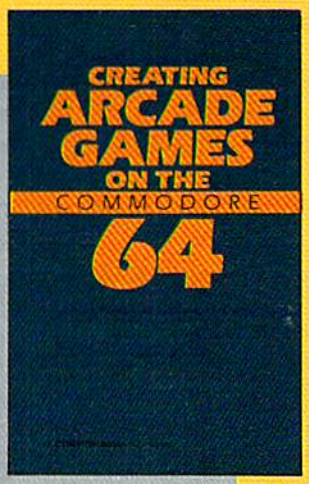

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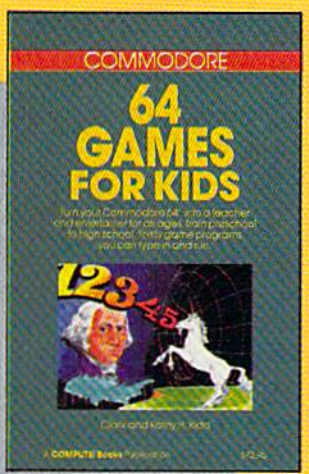

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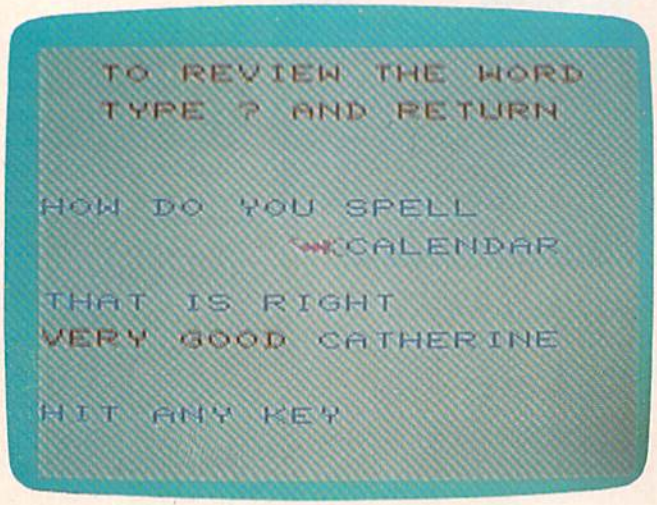
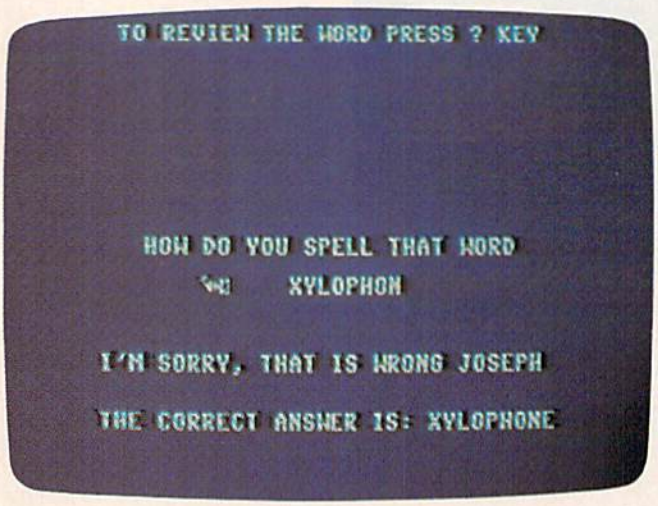
Spelling Critter

Bob Nickel



The "critter" does his thing when the word is spelled correctly (VIC version).


TO REVIEW THE WORD PRESS ? KEY
HOW DO YOU SPELL THAT WORD
XYLOPHON
I'M SORRY, THAT IS WRONG JOSEPH
THE CORRECT ANSWER IS: XYLOPHONE

In this 64 version, a correct spelling is given.

This spelling program lets your child choose the words in the quiz, and features an animated critter which keeps track of right and wrong answers. For the VIC-20 and Commodore 64.

One of the great uses for the home computer is education, and a wide variety of educational programs are available for the VIC-20 and Commodore 64. The only exception is spelling programs. If you have ever tried to put your kids' spelling list into someone else's program, then you know what I mean.

This is the magic of "Spelling Critter." The program actually asks you what words are to be used. This way the kids will be more likely to use it on their own.

There are three main parts to the program. Line 50 sets up an array to store the words. Lines 5000–5300 input the words with a FOR–NEXT loop. Lines 100–120 get the words back, one at a time, with another loop.

A Random Quiz

If you want the words to come up in a random pattern, the following changes should be made. All the words may not be displayed, however.

```
100 B=INT(RND(1)*N)+1
110 Z=Z+1
470 IFZ=N THEN 500
480 GOTO100
```

The critter is built in lines 20–32. There are actually three parts to the critter, one tail and two heads. You will not see one of the heads, but it is needed for the chomping effect. This is all done with a programmable character routine, which is extremely easy on the VIC. The *Programmer's Reference Guide* goes into this in depth (pp. 82–88).

Animation Subroutines

There are two subroutines for the animation. Lines 7000–7080 move the critter for a correct answer while lines 8000–8080 are the animation for a wrong answer. Lines 100–160 display for one second, which is enough time to read the word, but not long enough to memorize it.

The rest of the program should be self-explanatory. The program will accept up to 50 words. Each word can be up to ten letters long without exhausting the memory of the unexpanded VIC.

Try the critter on your kids. It fills an important spot in educational programming and can be downright fun.

See program listings on page 167.

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Shape Match

Michael Reich

Do you have a preschooler who demands time on the computer, but can't handle complicated software? "Shape Match" teaches pattern recognition, and it's easy to use. For the 64 and expanded (8K+) VIC.

In Shape Match, a child has to match the shape on the screen with one of four other shapes. It's a good idea for an adult to sit with the child while the game is running, to provide suggestions (and praise when the answer is right).

A simple idea can lead to complications, however.

A young child is not capable of handling a joystick or moving a cursor around the screen with keyboard controls. And yet there must be a way for the child to indicate his or her choice.

The answer is to have the program point to the different answers. The child presses a key to make a guess. Lines 600–687 move the colored box from answer to answer and periodically go to the subroutine at 700 to see if a key has been pressed.

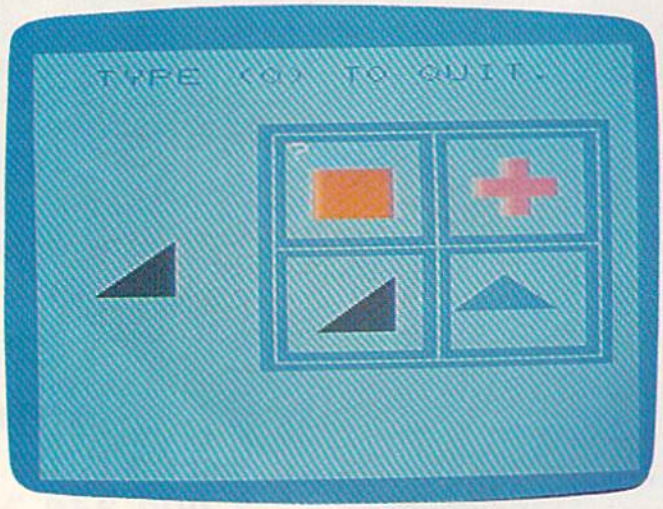
Another difficulty is how to figure out whether the child is right or wrong. Of the four possible answers, only one is correct. How does the computer know which one was picked? The solution is an array (lines 60 and 70). The computer checks which box is lit, compares it to the array, and decides if it is the right answer.

Shape Match was written for the Commodore 64, although it will run on a VIC-20 with 8K or more of memory expansion.

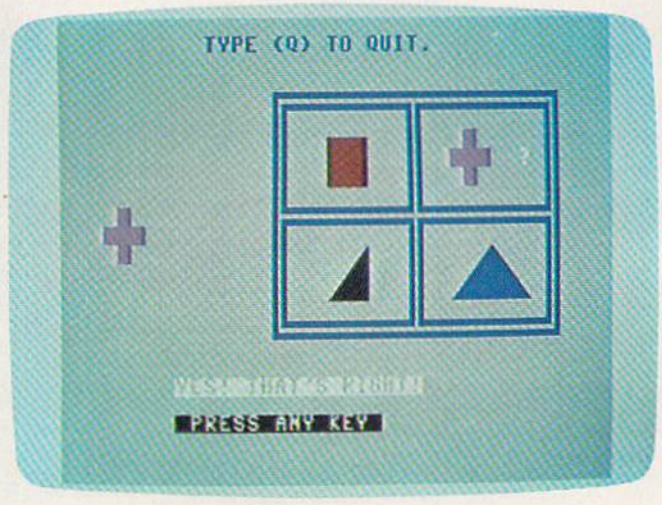
For those who might want to add music or other features, here is a breakdown of the program:

Lines	
50–57	Determine if the program is being run on a VIC or 64, DIMension array CL, select screen & border colors
60–70	Initialize array
200	Prints four boxes
340–375	Print a shape in each box
380–385	Use random variable K (from line 310) to pick a shape for the match. Variable KK holds the last K value to prevent consecutive repeats.
600–687	Move cursor through each box
700–880	Check for response and evaluate answer
1000–1095	Print board with jump from line 200
1170	Subroutine to locate correct screen location for all printing
2000–2330	Print statements for four shapes
3000–3200	Instructions

See program listing on page 180.



The program cycles through the patterns waiting for the child's guess (VIC version).



A correct answer is given in the 64 version.

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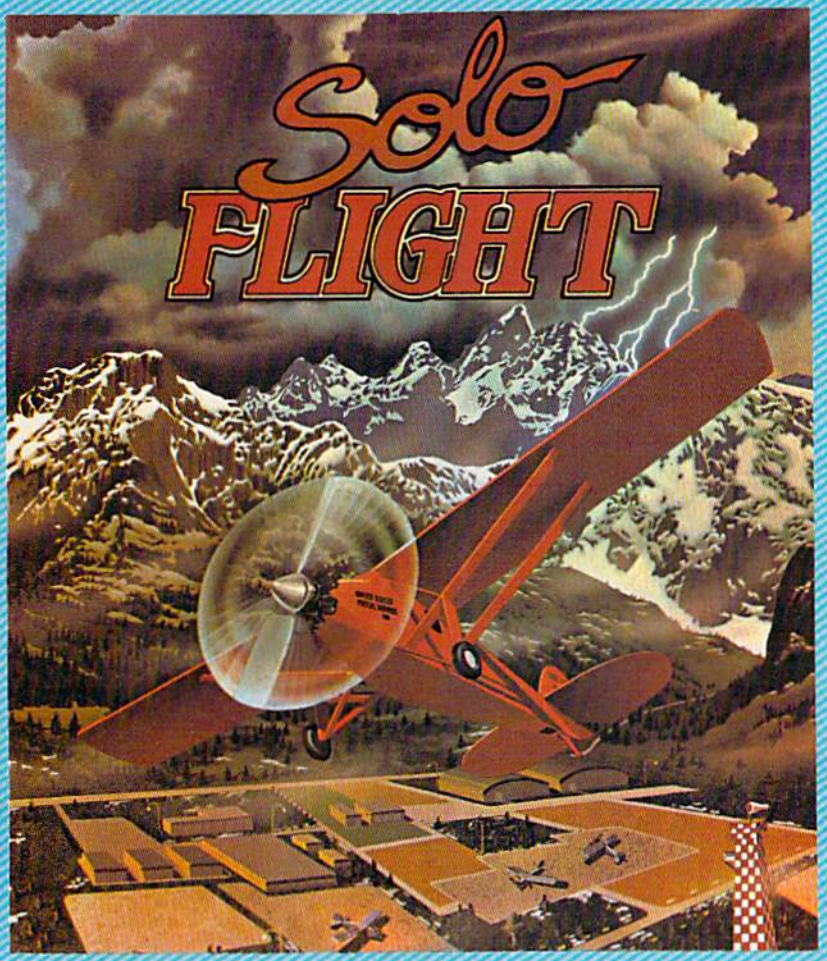

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Word Scramble

Mike Salman

Match wits with an opponent in this game as you play against time. For two or more players, VIC and 64 versions are included.

"Word Scramble" is written for two players, but you can make up teams and enter the names of the team captains as the two players. The computer first asks you for the names of the players. It then instructs player one to enter a common word (maximum ten letters).

A Three-Minute Puzzle

When the word has been scrambled, player two presses the space bar to see the scrambled letters. The player has three minutes to discover the word.

At the top of the screen, a display of the elapsed time appears, followed by the scrambled word. Below the scrambled word, a bar appears, on which you type the first letter of the word. If you type the wrong letter you hear a buzz. Type the right one and you hear a beep; the letter then appears on the screen.

A Ten-Point Penalty

If you find the word within the allotted time and have made no wrong guesses, you are awarded fifty points. For every wrong guess that you make, you lose ten points. A scoreboard is displayed every second turn so you'll know when both players have played an equal number of rounds.

See program listings on page 170.

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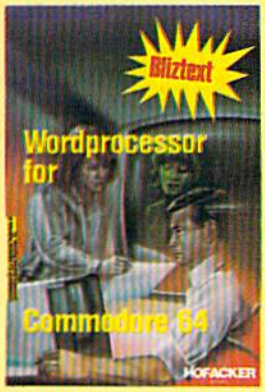

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C. REGENA

Planning A Game Program

This month, let's explore a step by step procedure to write a game. To keep it simple, yet worthwhile, we'll create "Tic-Tac-Toe." It's easy to understand, and everyone knows the game, but programming it involves graphics, logic, and strategy.

I started out with the graphics. Tic-Tac-Toe is graphically simple, an X marker, an O marker, and four straight lines. On the Commodore 64, I let the X and O markers each take up a pattern 5 characters x 5 characters, so the basic game grid needed spaces 7 x 7. On the VIC, we have larger characters and fewer characters per line, so I chose X and O markers 4 x 4, and the grid needed 6 x 6 spaces.

Creating The Grid

The grid lines are made up of solid blocks one character wide (the reverse space). You can either PRINT the grid or use a series of POKEs to place the colored squares on the screen. I chose to use the POKE method. First the screen is cleared and a random color chosen for the grid, in line 790 of the 64 version (line 38 in the VIC version). The random color on the 64 can be one of 14 colors, but not black or white. (You couldn't see a white grid, and I didn't like black.) On the VIC there can be six colors, but not black or white.

The grid is drawn in lines 800–870 (39–40 in the VIC version). In the 64 version, the variable A is previously defined as 160, the screen code for a reverse space, or a solid block of color. To draw on the screen, you need to POKE a screen location with 160, then POKE the corresponding color location with the color. The variable C relates the screen memory location to the color memory location. Lines 880–890 (VIC line 41) place numbers in the positions to be chosen as plays are made.

The X and O markers are drawn in subroutines at the beginning of the program, lines 120–280 (VIC 2–7). The nine coordinate positions for the markers to be drawn are READ in as S(I) in lines 590–610 (VIC 28–29). The graphics are now complete.

Next I programmed the player moves. The squares are numbered so the player just presses a number from 1 to 9. I like to avoid INPUT if at all possible. In this case only one key press is necessary, so we can use GET. You could also use PEEK, but GET is easier to understand. GET E$ gets the key pressed, and we need to make sure the key is one of the numbers from 1 to 9. All other keys are ignored.

Plotting The Move

VAL converts the string E$ to a VALue, the number E. P(E) is the value in that position on the grid—3 for an X, 1 for an O, and 0 if there is no marker in that position. If there is already a marker on the position chosen, the player must choose again. If the square is available, P(E) is set to 3 or 1, S(E) is the coordinate of the position, and the appropriate marker is drawn. This process is in lines 980–1000 (VIC 47–49).

Next it's the computer's move. For the beginner level I just let the computer randomly choose any one of the available spots, lines 930–950 (VIC 44–45).

Since the value of N or X changes between moves and can be either 1 or 3, the relative formula is N = ABS(N–4), line 540 (VIC 27).

Is The Game Over?

After each marker is placed, the computer checks to see if the game is over. First the rows are checked to see if there are three X's or O's in a row, lines 360–400 (VIC 12–16). Next the columns are checked to see if there are three the same in a column, lines 410–450 (VIC 17–21). Next, diagonal wins are checked, lines 460–480 (VIC 22–24). If there isn't a win, all spaces are checked. If all spaces are filled, it is a tie game. If there are empty spots, the game continues, lines 490–530 (VIC 25–27).

If there is a winner, the program branches to lines 1540–1700 (VIC 89–97), to congratulate the winner and play a tune made up of random notes. The program then offers the option to try again and branches appropriately. Lines 570 and 640 (line 31 of the VIC version) set variables for playing the music and the prompter beep, and the subroutine in lines 290–330 (VIC 8–9) plays the tone and delays.

The game could be complete now, but it wouldn't be very challenging because the com-

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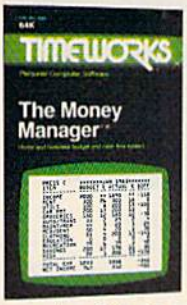

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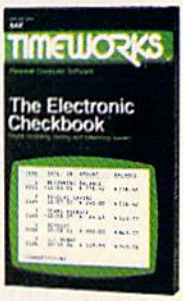

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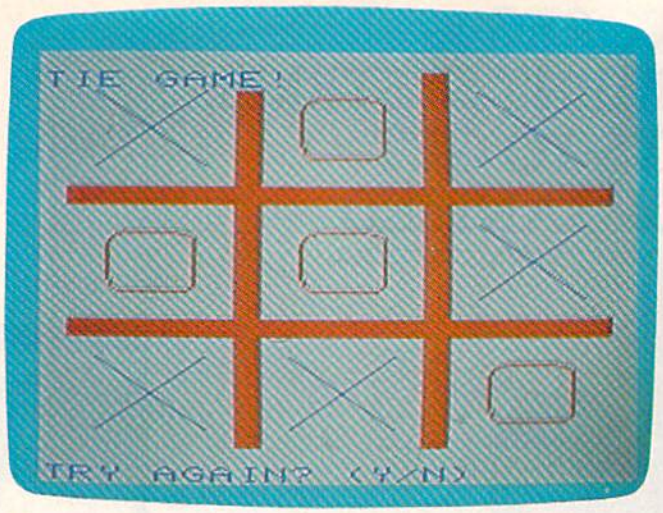
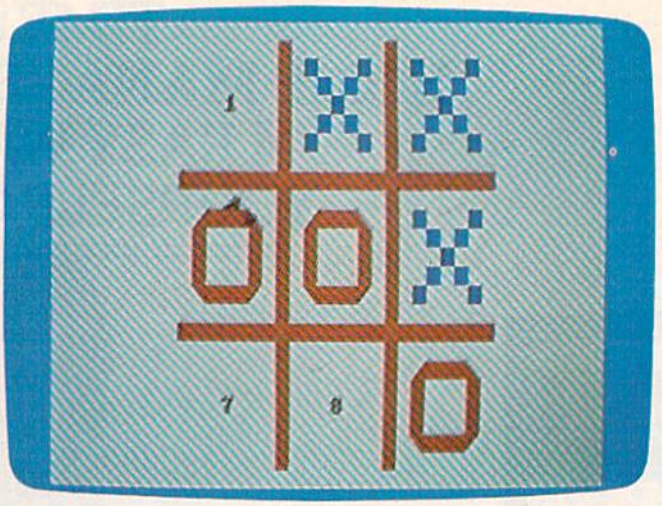


A tie game offers another round (VIC version).



Standard characters make a clear display (64 version).

puter's moves are chosen randomly—no strategy involved. Now we need to add an intermediate level of play and some method of choosing the computer's moves. I'm calling this an intermediate level so you can add your own advanced level and perhaps a more sophisticated way of winning.

The Computer Gets Smarter

The computer's intermediate level of play is in lines 1030–1530 (VIC 51–88). The strategy I used was first to get the center spot if it is available, line 1060 (VIC 52). On later turns, if the computer has the center spot, it checks for possibly winning by filling the two diagonals.

The columns are checked in lines 1130–1200 (VIC 58–63). If an opposing marker is in the column, the column is ignored. If there isn't an opposing marker, there is a check to see if two of the computer's markers are in the column. If so, a marker is placed in the remaining spot to win. The rows are checked similarly in lines 1210–1280 (VIC 64–69).

If the computer doesn't spot a winning possibility, it will then check to prevent the opponent's winning. If there are two of the opponent's markers in any column, row, or diagonal, the computer will block the win, lines 1290–1490 (VIC 70–87).

If the computer does not spot a column, row, or diagonal with two like markers in it, the computer just chooses a place at random.

You can probably follow the logic in the 64 version, but I had to take out the REMarks to save memory in the VIC version. In the IF-THEN statements, P(K) will contain the value of the marker in a particular position, number K, where K is one of the nine positions. P(K) can be 0 if no marker is there, or 3 or 1 if a marker is there. After THEN you can set E to the position chosen, then GOTO a different line.

CLR Or Crash

I used the command CLR if the option to play again is chosen. This command clears the memory of all variables and unsatisfied FOR-NEXT loops and GOSUB-RETURNs. Without CLR, after several games I would get an OUT OF MEMORY message, which can be caused by too many nested FOR-NEXT loops or too many GOSUBs in effect. Notice that the IF statements transfer control out of FOR-NEXT loops and out of subroutines.

The last step of programming was to add the title and instructions at the beginning of the game. I usually PRINT the title and instructions as I am defining variables for the program. The title and instructions are in lines 560–690 (VIC 28–31). The options of markers and level of game are in lines 700–780 (VIC 32–37).

The program isn't complete until you test it. Game programs usually involve quite a bit of testing. You need to check all types of player input—right choices, wrong choices, other keys. In this particular game I had to check the player choosing first move or second move and beginner level or intermediate level (all combinations). I also checked the player winning, the computer winning, and a tie game. The supreme test is to have someone else try the game for you.

If you are typing in the VIC version of this game, be sure to leave out all unnecessary spaces. Notice that the lines are numbered by ones to conserve memory.

If you wish to save typing effort, you may obtain a copy of Tic-Tac-Toe by sending $3, a blank cassette or disk, and a stamped, self-addressed mailer to:

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Be sure to specify the title and which computer version you need.

See program listings on page 171.

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HORIZONS: 64

CHARLES BRANNON
PROGRAM EDITOR

Let's start out this month with a look at a great game: *Blue Max*.

Maybe you've played *Zaxxon*. Your ship scrolls through a 3-D playfield as you bomb planes, silos, and enemy aircraft. You can move up or down in space as well. And to help you gauge your perspective, your ship even has a little shadow.

Blue Max has a similar concept, but instead of a spaceship, you're flying a World War I biplane. As you fly over scrolling enemy territory, you can bomb, strafe, shoot down enemy planes, even land and take off from a runway. *Blue Max* has far more depth than *Zaxxon*. It's one of those few good games that have successfully combined strategy with arcade play.

Takeoff

When you start the game, you taxi your plane to the end of the runway. When your speed reaches 100 mph, push up on the joystick to take off. If you haven't gained enough speed, though, your plane will stall and crash.

You can control your plane in two ways. In one mode, you push up on the stick to go up and pull back to go down. This is opposite of actual airplane joystick controls. (Yes, "joystick" is an aviation term, too.) There is another mode that behaves in a standard way—pull back to climb, push forward to descend. You can also choose various skill levels, and whether or not to obey the law of gravity. If you turn on the gravity, your plane will gradually descend if you let go of the joystick. With no gravity, your plane more or less hovers as it flies.

There's a lot of detail here. The scrolling playfield is colorful and full of targets like buildings, bridges, cars, boats, tanks, guns, runways, even the enemy city. To bomb, you pull back on your stick while you press the fire button. To strafe, you go to a low altitude (the command window turns red) and press fire.

There are many status indicators to keep an eye on, just as in real flying: speed, fuel, altitude, and damage. The status window at the bottom of the screen keeps you informed. It normally has a black background color, but will turn red if you fly low, yellow if you're too low (impending crash) and blue if you're at the same altitude as an enemy plane (ripe for the picking).

Periodically, a big letter P announces that an enemy plane is in the area. You align yourself with it and press fire as you try to hit it with your guns. Be careful not to crash into the plane or the game's over. You only get one "life." W tells you that a strong wind is blowing, and L signals a friendly runway. Smaller letters also light up to warn you of damage to the guns, bombs, your maneuverability, or the fuel tank. If you have damaged something, it will work intermittently, if at all. The only way to make repairs is to land at a friendly runway.

When L shows up, begin your approach. Landing is quite difficult—you'll probably crash the first time you try it. Come in low and try to land at the start of the runway. Your speed will drop radically, then you will roll to a stop. Fuel tanks are filled and any damage is repaired. You then make another takeoff.

Be sure to give yourself plenty of runway, though, or you'll crash into the trees. And if you run out of fuel, you'll have to glide until you crash (most likely) or luck onto a runway.

The point of the game, besides the fun of being airborne, is to shoot enough targets so that you can advance to the enemy city. At the city, you have to bomb a statue. If you can do this, you'll be awarded the Blue Max medal. Otherwise, you'll have to be satisfied with rankings like "Runway Sweeper, Class One."

Blue Max
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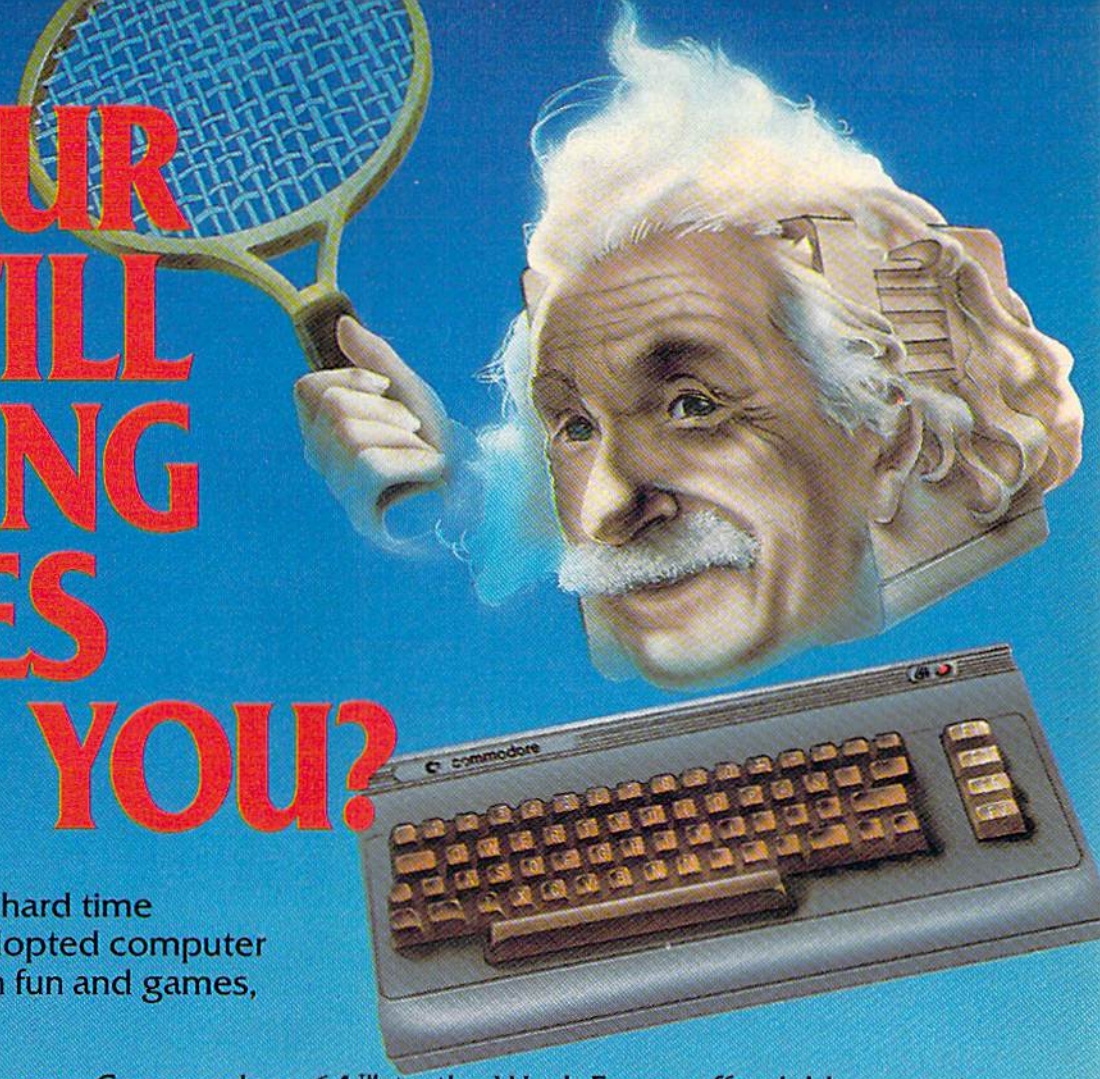

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Apple Emulator For The 64?

We've heard the claims before about a device that lets you run Apple programs on your 64, but it's always been a pipe dream. Your 64 can easily match any Apple graphics, but the screen storage, ROM routines, graphics calls, beep sound, disk format, and joystick interfaces are totally incompatible. The goal of an Apple emulator is to let you just insert an Apple disk, turn the power on, and begin to use the software, whether it is a word processor, arcade game, or an accounting package.

The only way this is possible is to actually have an Apple. Sorry. The second best thing is to plug an Apple into your 64. That's right. A whole Apple on a single cartridge that would plug into your 64. You see, that's the only way to get true compatibility. You could make an Atari VCS, or even an old shoe run Apple programs with enough hardware. And whether you plug it into your 64 or a pair of penny loafers, it's still an Apple. And it can't be very cheap.

Given that it's theoretically possible, it should be available, right? Well, you can buy an Apple emulator. It's called the AP Modular Pak, and it's made by a Canadian company called Pioneer Software. You get an expansion box, with eight Apple expansion slots and four 64 expansion ports. A CPU card plugs into the box. It's the magic one—it makes the Apple software work on the 64. You also need an AP DOS card, which actually converts your 1541 drive into an Apple-compatible one (quite a feat!) The whole system is $525. If we're able to obtain a review unit, we'll give you the details on how it works, and how well.

The price tag is a bit steep—let's face it, it's three times as much as most of you paid for your 64. But it does let you use your existing equipment and disk drive as a second computer. Even if you buy the AP Modular Pak, is there really some Apple software you want to run on your 64? 64 games are far superior to Apple games (sorry, Apple fans—maybe you can plug a 64 Pak into your computer one day). There's a great deal of software for the 64 that was engineered especially for your computer. All the major Apple programs are available in versions for the 64 anyway. But if you want to own both worlds, maybe the Pak's for you.

PCjr Vs. Commodore 64

Recently, I've been working with IBM's new PCjr, and have had a chance to compare it with other computers, including the 64. Both of them are home computers. Which is best? I knew you'd like that question. Of course, no one computer is "best," but some are more suitable than others for certain applications. (For games, the 64 wins hands down, though.) I really like both computers. First, let's compare them on equal terms:

Commodore 64 with 64K, 1541 disk drive
PCjr Entry Model, 64K, disk drive

Commodore 64 system price: about $450
PCjr system price: $1149

Other comparisons:

Graphics

64: 320 x 200 (high resolution), 160 x 200 (medium resolution). 16 colors simultaneously in text mode. Upper- and lowercase, or a complete graphics character set. Sprites.

PCjr: 320 x 200 in as much as 16 colors simultaneously. 640 x 200 high resolution. 40 columns in text mode with 255 possible character attributes including independent foreground and background colors. 80-column capability (optional). Some graphics characters. Beautiful, sharp RGB color capability (but expensive). No sprites. Repeat: no sprites.

Sound

64: The one and only SID chip with three voices, 16-bit resolution, waveforms, ring modulation, synchronization, filtering, and more.

PCjr: A TI sound chip, just like the one in the TI-99/4A. IBM calls it a sound synthesizer. Ahem. Three voices with independent volume control with a 12-bit range. White noise.

Keyboard

64: 66 keys, typewriter style. Full travel, full size. Four function keys with eight states. Soft reset key. Cursor and editing keys.

PCjr: 62 keys. Some call them chiclets, but they're not that bad. The smaller than normal keys have full travel, and can accept overlays that can fully redefine the keyboard, so there's no lettering on the keycaps. Cursor and editing keys. Cold reset available from the keyboard. IBM calls its keyboard the Freeboard. There's a cordless infrared link between the keyboard and the system unit. No dedicated function keys, but ten keys can act as function keys. Can generate all IBM key codes.

Input/Output

64: Proprietary serial bus for disk drive, printers, and other Commodore devices. Expansion port with all bus signals (also acts as cartridge slot). Parallel user port with RS-232 capability. Two digital joystick ports which can also accept a light pen or four paddles. Audio/video port and built-in RF modulator for TV. Cassette port for Commodore tape drive. Up to four 1541 disk drives with 170K storage each, single-sided. CP/M capability.

PCjr: Built in ports provide TV output (modulator extra), color monitor output, RGB output, two 64K cartridge slots, RS-232 serial, light pen, two analog joystick ports, cassette port for an audio

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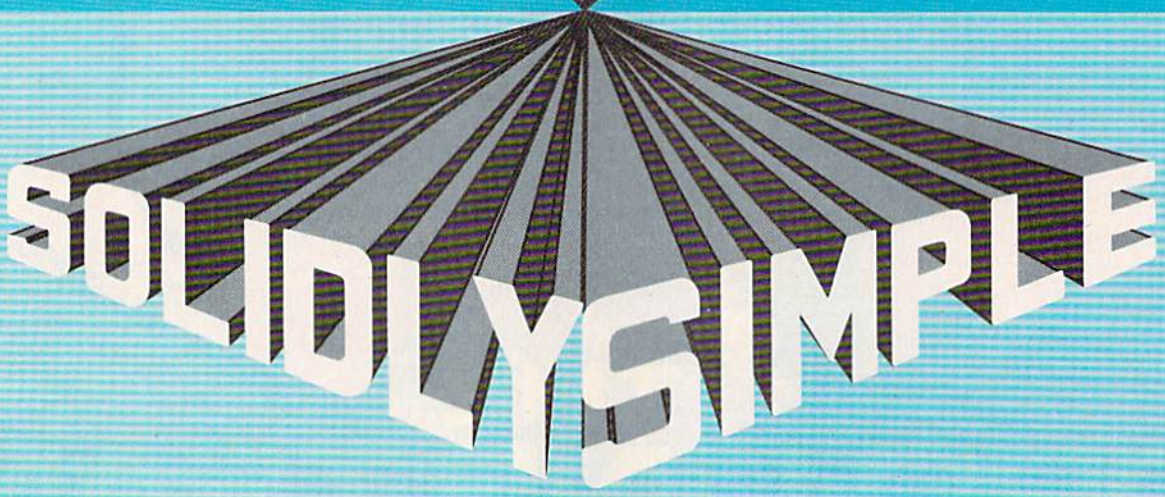

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tape recorder. Optional internal modem. No CP/M capability yet. Only one built-in double-sided disk with 360K storage. DOS (required) is $65 extra. The drive is very fast compared with the 1541. You can load 32K in 16 seconds.

Software

64: A simple Microsoft BASIC built in. Thousands of public domain programs. Thousands of third-party programs. A wide range of Commodore software.

PCjr: A full Microsoft BASIC, with extensions for file handling, graphics, sound, error trapping, event trapping, interrupts, and more. Optional Cartridge BASIC required to run disk drive and access extended graphics modes and the sound chip. Compatibility with hundreds of IBM PC programs. "PC-compatible" says a lot to many people.

As you can see, the 64 holds its own against Big Blue's entry home computer. You just can't compare them price-wise, though. Both initially and in the future, the 64 will save you hundreds of dollars—and you can still do the same things and enjoy some superior features. The 64 will be around awhile as the Volkswagen of home and personal computers—especially with such devoted and interested users.

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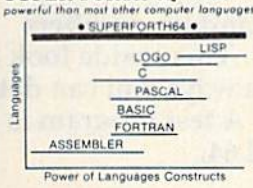

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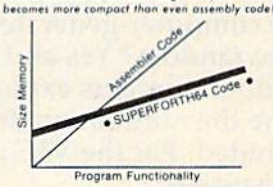

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Inside Random Numbers

Dan Carmichael, Assistant Editor

Are computer-generated random numbers truly random? Yes and no. This inside look at random numbers explores ways you can determine the random quality. A test program is included. For the VIC and 64.

Computers, if nothing else, are logical. But in certain programs, especially games, you'll want your computer to generate a random number. The RND command does this.

How random are those numbers? How can a computer pick a number out of thin air?

The VIC and 64 produce random numbers by taking a *seed* number, multiplying it by another number, adding yet another number, and scrambling the bytes. The result is not a truly random number, but it suffices for most applications.

The seed (and the random number) are stored in *floating point* format. In Commodore BASIC, five bytes are needed for each floating point number, even if the number is a single digit, like 1 or 2.

The BASIC RND command can generate random numbers in both the VIC-20 and the 64. In its simplest form the RND command generates a random number between zero and one (not including zero or one). To see how this is done, enter the following BASIC program:

```
10 PRINT RND(1): GOTO10
```

A Choice Of Arguments

Whenever you use RND, you must include a number in parentheses immediately after it. This number is called the *argument*. The number in the argument determines the seed value which is scrambled to create the random number. There are three ways of seeding the RND function—using a positive number, a negative number, or zero.

Using a positive number as the argument is by far the most common method of generating random numbers because it is the most reliable. When you use RND (1), the computer looks at memory locations 139–143 and uses the values there for the random seed. When it has finished, it puts new values into those slots. Any positive number can be used. The value does not matter, only the fact that the number is positive.

A negative argument will give you a predetermined result—a nonrandom number. To test this, try substituting RND(–1) or RND (–900) in the program above. The same number comes up every time. Because the results are predictable, negative numbers are used not to generate random numbers, but to put a certain value into the seed bytes at 139–143. If you use RND (–N) to set up the seed and then use RND(1), the series of numbers will always fall in the same order. This can be useful in debugging a program.

RND(0) checks the value in the system time clock and uses it for the seed. There are some problems with using it regularly, especially on the 64, but if you use it once at the beginning of a program, it can be a good way to (almost) randomly seed the random seed. Another method of randomizing, RND(–TI), is discussed later.

By adding a few options to the command, you can produce numbers of almost any size and range. Enter the following BASIC program.

```
10 PRINT INT((RND(1)*6)+1);: GOTO10
```

In this example we've produced random numbers between 1 and 6. This might be useful in a program that simulates the throwing of dice. We've also added something new—the INTeger command. Remove the three letters INT from the above example, and run the program again. As you can see, without the INTeger command you get numbers with up to nine significant decimal places.

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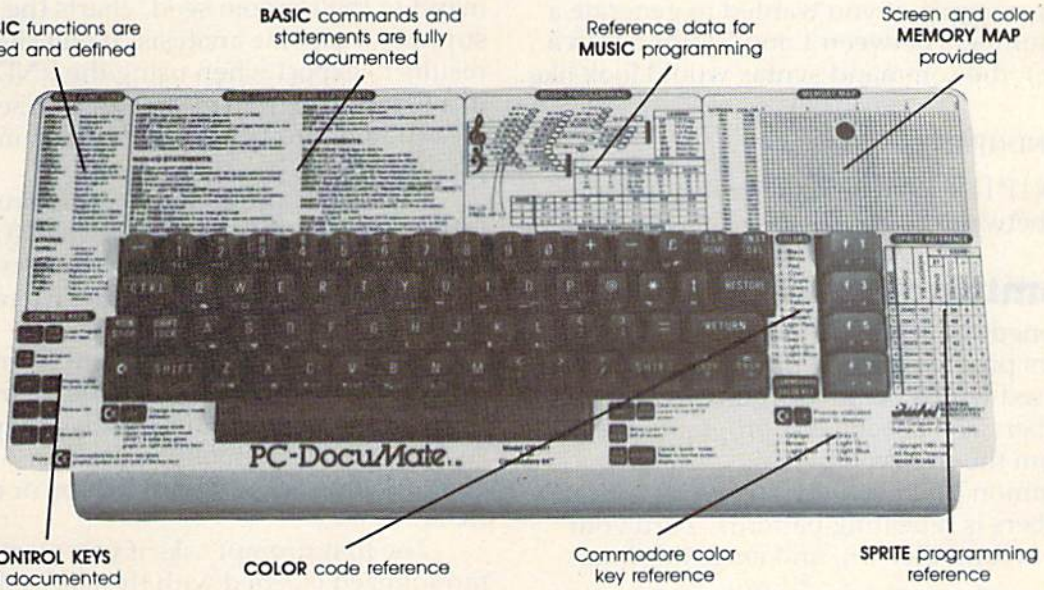
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The INTeger command converts decimal numbers to whole numbers by dropping anything after the decimal point. Type this line and press RETURN:

```
PRINT INT(1.1)
```

The result is 1. This is the INTeger value of 1.1. One important fact to note about the INT command is that it does not round off. Type and enter:

```
PRINT INT(1.9)
```

As you can see, the INT value of 1.9 is also 1, not 2 as you might expect.

Always use INT with RND when you want whole numbers. This will be the case in most applications. After all, if you were writing a dice game, you wouldn't want to throw a 6.38340299.

The RND command is certainly not limited to a range of six numbers as in the above example. As a matter of fact, the range of possibilities is almost limitless. The most common RND format is this:

```
INT(RND(1)*range+base)
```

where *range* is how many numbers you wish to generate, and *base* is the lowest number of that range. For example, if you wanted to generate a range of numbers between 1 and 52 (for use in a card game), the command syntax would look like this:

```
INT(RND(1)*52+1)
```

INT(RND(1)*11+10) would generate random numbers between 10 and 20.

Randomizing Random Seeds

As mentioned above, the random seed is the origin of numbers produced when the BASIC RND command is used with a positive argument. The random numbers you use in your programs are extracted from the five seed bytes.

A common problem when working with random numbers is repeating patterns. Turn your computer off and then on, and enter this line:

```
FORA=139TO143:PRINTA,PEEK(A):NEXT
```

This shows you the contents of the five random seeds. If you continue turning the computer off/on and entering this line a number of times, you'll notice something interesting. The random seed bytes always contain the same values after power up. As a matter of fact, the values you're probably getting are 128, 79, 199, 82, and 88.

The fact that the random seed is always initialized with the same values creates the possibility of repeated random number patterns. For example, turning on your computer, loading the same game, and playing it in the same sequence is likely to produce the same results. This isn't much fun in a game based on the luck of the draw.

The answer is to randomize your program. This can be done with one BASIC line. If you want your computer to produce truly random numbers without repeating patterns each time you play a game, start with a different random seed each time it is run. This is done by initializing the random seed with the use of the system (computer) clock. Turn your computer off and on, and enter the following line:

```
X=RND(-TI):FORA=139TO143:PRINTA;PEEK(A):
NEXT
```

The command X=RND(-TI) is the key to producing a random seed that is varied each time the program is run. In effect, this BASIC statement gets values from the jiffy clock (TI), and POKEs them into the random seed. Because the clock changes every sixtieth of a second, the odds against repeating a random seed are great. Adding this line to the beginning of your BASIC program (before the RND statement is used) will create a different seed each time the program is run.

Testing Random Numbers

"Random Number Test" checks the RND command or the random seed, charts the results, and supplies a capsule analysis. It will show you what results to expect when using the RND command in a BASIC program or the random seed to generate random numbers within a machine language program.

For BASIC programmers, the program will test any range of numbers between 0 and 255. And machine language programmers have the option of testing any one of the five random seed bytes.

Carefully enter the Random Number Test program. The DATA statements in lines 885 through 941 are for a machine language program, so they must be entered accurately. After entering and SAVEing the program to tape or disk, type RUN.

The first prompt asks if you want the seed randomized (seeded with the clock). Press R to randomize; otherwise, press RETURN. The next prompt asks what type of computer you have. If you have a VIC-20, enter V. Press RETURN for the 64.

The third prompt asks you to press either the f1 key to test the random seeds, or the f3 key to test the BASIC RND command.

If you choose f1 (test the random seeds), the next prompt asks which random seed byte you wish to test. The five keys (1–5) correspond to the five random seed bytes (139–143).

If you choose f3 (testing the BASIC RND command), the next prompt requests two numbers between 0 and 255. This is the range of random

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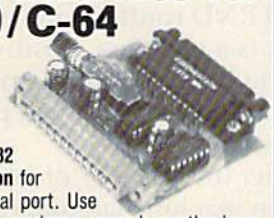

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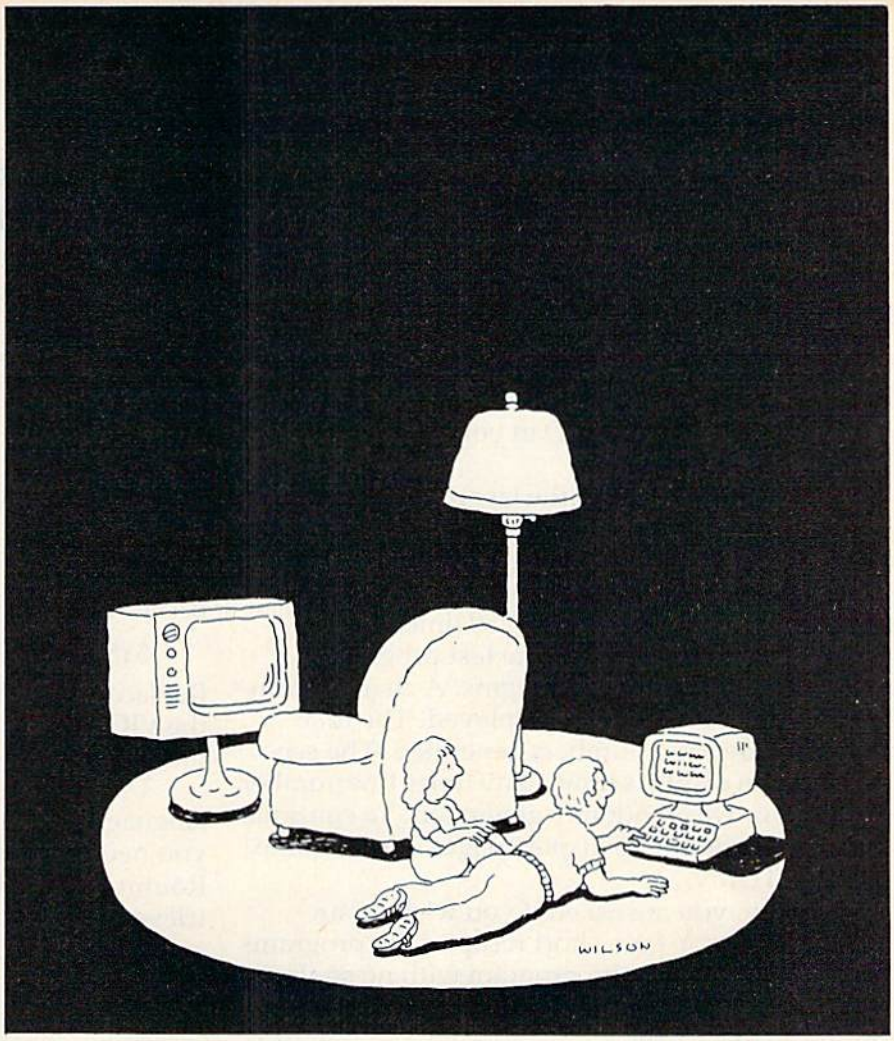

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numbers you want to test. Enter the two numbers separated by a comma, then press RETURN. For example, if you want to test the numbers between 1 and 6, enter 1,6 then press RETURN. The test range must include two or more numbers. Entering 1,1 or 123,123 would test only one number and is not a legal entry.

The program generates random numbers in the range you specify while in BASIC, then branches to the machine language program that does the tallying. Testing the RND command in this way demonstrates the randomness you can expect when you use RND in your BASIC programs.

After responding to the last prompt, the program begins running. The first stage of the program can be ended by pressing the f1 key. The program will also end if any one number is generated, or occurs more than 65,280 times.

After the first stage of the test program has ended, the analysis phase begins. A chart of numbers between 0 and 255 is displayed. The first column shows the numbers generated. The second column displays how many times this number occurred or was randomly generated. To continue stepping through the display pages one at a time, press RETURN.

Finally, you are asked if you wish for an analysis. Press Y for a short recap of the programs run. Press N to end the program with no analysis.

Here's a description of the totals displayed on the analysis page:

Total Numbers Hit — how many numbers received at least one hit. For example, this total would be 5 if you were testing the RND command with a range of 1–5, and all 5 numbers were hit.

Total Count — the total number of hits, all numbers included. In the above example, if all numbers 1 through 5 were hit 5 times each, this total would be 25. This also reflects the total number of passes the program made.

Average Count — the average hits per number. For example, if we were testing the range of 100–101 and 100 was hit 2 times, and 101 was hit 4, the average would be 3. Use this total to determine the randomness of the test run. For example, if you tested the whole range of numbers (0–255), and the average count read 10,123, but the number 2 was hit only 3 times, you'd know of this disparity.

Lowest Count — indicates the lowest number of hits any one number received. In the above example (0–255) the *lowest count* would be 3 because the number 2 was hit only 3 times.

Highest Count — indicates the highest number of hits received by any one number.

Total Zeroes — indicates how many random numbers received no hits.

Although the recap analysis is brief, it is helpful in illustrating how well the random function is behaving.

RND And Machine Language Programming

What about generating random numbers for machine language applications? Of course, you could always RTS (branch back to BASIC), generate a random number with the RND command, and return to machine language. But this would reduce the speed of the machine language program.

The answer can be found at address $E097 (decimal 57495) in the 64, and $E094 (decimal 57492) in the VIC-20. These addresses are the start of the routine in the Kernal that places random values into the random seed bytes. Type and enter this BASIC line to demonstrate how it works:

```
SYSxxxxx:FORA=139TO143:PRINTA,PEEK(A):NEXT
```

Replace xxxxx with 57495 for the 64, and 57492 for the VIC. As you can see, each time this BASIC statement is run, the values in the random seed change.

Using these Kernal routines in your machine language program is fairly straightforward. When you need a random number, JSR (Jump to Sub-Routine) to the Kernal routine. You can then retrieve one or more of the values in the random seed bytes, and away you go. Of course, processing the values is up to you.

However, there is one important point to remember when generating random numbers in machine language. As mentioned earlier, seeding the RND command with a negative, positive, or zero value will produce different results. When you use the Kernal RND routine, one of the first things it checks for is a negative, positive, or zero value in the Floating Point Accumulator. Make sure the FPA contains values that will produce the results you desire.

There is another unique way of generating random numbers in machine language, using the I/O block in your computer. The I/O block is an area of memory (starting around 56320 in the 64, and 37000 in the VIC) that is constantly changing, doing such things as updating the screen, and manipulating data direction registers and timers. First, find two bytes that have constantly changing values. Load the accumulator with the value in one byte, and either the X or Y register with the other. You can then rotate (ROR or ROL) the accumulator with the X or Y register.

Does RND Generate Random Numbers?

Our results from Random Number Test are interesting. First is the way the random seed bytes behaved.

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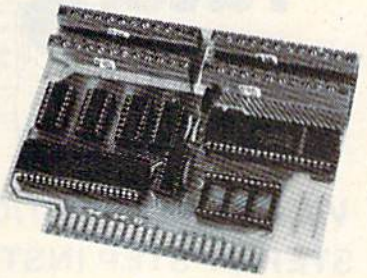
NEW! Universal Input/Output Board for VIC-20/64



- 16 channel 8-bit A/D converter with 100 microsecond sampling time.
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Works with all centronics type parallel matrix & letter printers and plotters—Epson, C.Itoh, Okidata, Nec, Gemini 10, TP-I Smith Corona, and most others. Hardware driven; works off the serial port. Quality construction: Steel DIN connectors & shielded cables. Has these switch selectable options: Device 4, 5, 6 or 7; ASCII or PET ASCII; 7-bit or 8-bit output; upper & lower case or upper only. Recommended by PROFESSIONAL SOFTWARE for WordPro 3 Plus for the 64, and by City Software for PaperClip.

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The most interesting of the five bytes (139–143) was 139. After 129,873 passes, the results were very lopsided. Although the whole range of possibilities (0–255) was tested, only 15 numbers received hits, the numbers between 114 and 128. And each number received approximately twice as many hits as the previous number. The number 127 received 32,287 hits and 128 was about double that amount with 65280. This is because of the way base ten numbers are translated into floating point format. This byte would not be very usable for generating random numbers because of the poor dispersion pattern.

Also of interest were the test results of random seed 143. The pattern here, although it did display a few glitches, was usable. The majority of numbers (236) received a relatively random number of hits. A few numbers received zero hits.

Finally, the biggest surprise was the testing of the BASIC RND command. The range tested was 1 to 6, and the surprise was the results. The activity was evenly distributed over the entire range with the number 3 receiving 38,593 hits (the lowest), and the highest number 4 with 39,418 hits. The average was 39,061. These test results seem to indicate that the BASIC RND command is effectively random. All tests were run after the random seed was initialized with the clock.

See program listing on page 174.

The Simpler, the Better

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80 Column Smart Terminal
For Your C64 Without Any Hardware Change!

VIP Terminal ready 11:15:26
Dear Pepper,

You're right. This VIP Terminal is the only terminal for the C 64 worth owning. That freebie software that came with my modem just didn't work, especially with my new smartmodem. The 80 column display alone was well worth the $49.95 - much less the 40, 64 and 106 character displays - and it doesn't need any hardware changes. Imagine 106 characters on 25 lines. Heck, there's more text on my screen than on my uncle's Apple or my dad's I B M - P C!

I put auto-dial to work right away. I auto-dialed Compuserve, but couldn't get through, so I had VIP Terminal redial 'til it got through - it dialed five minutes straight! Then I auto-logged on with one of my 20 programmed keys, and downloaded some graphics screens, and stock quotes for dad. I printed it and saved it to disk as it came on the screen. Wow! And now I can send you my programs automatically. I got yours and they worked right off.

Those icons, - you know, like the Apple Lisa - are a lot of fun. I also like the menus, function keys, highlights, help tables - great for a newcomer like me. And with the many options there isn't a computer I can't talk to.

What's really neat is that Softlaw has a whole VIP Library of interactive programs, including a word processor, spreadsheet and database, which will be out soon. Sis promised me the whole set for my birthday.

I see by the built-in "old clock" on the screen that long-distance rates are down. Got to call that L.A. B B S. Yep, there goes the alarm. Later.

- Lone

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They're right! To start with the best you've got to have the **VIP Terminal!**

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- **Word wrap for a formatted display**
- **Talk to any computer**
- **Use any modem and printer**
- **Written in fast machine code**
- **15 entry phone directory**
- **20 programmable keys**
- **Automatically dial, redial, upload, download and log-on**
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- **128 character ASCII keyboard**
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- **Use and save files as big as your disk!**
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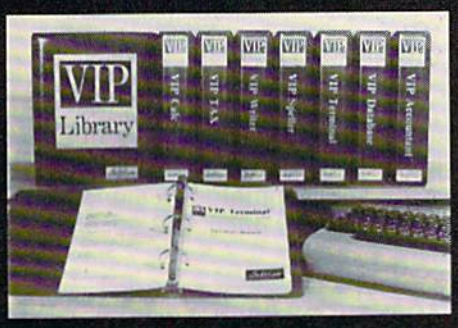
Get yours NOW! **$49.95**

Introducing The VIP Library

The Library Concept

The **VIP Terminal** is only the first in a whole series of elegant software for your Commodore 64 called the **VIP Library.** This complete collection of easy-to-use, serious, high quality, totally interactive productivity software includes **VIP Writer, VIP Speller, VIP Calc, VIP Database, VIP Disk-ZAP, VIP Accountant and VIP Tax.** All are equal in quality to much more expensive software for the IBM PC, and all are very affordable!



Virtual Memory

VIP Library programs are not limited by the size of your computer's memory. All programs use virtual memory techniques to allow creation and use of files larger than your computer's available work area. You're only limited by the space on your disk!

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Icons Make Learning Easy

Hi-res technology and sprites allow **VIP Library** programs to bring you task Icons, made famous by the Apple Lisa™ and the Xerox Star™. With these advanced sprite representations of the task options open to the user, even the total novice can, at a glance, perform every task with ease. Just look at the icon and press a key! No programs are easier or more fun to learn and use!

Total Compatibility

All **VIP Library** programs are compatible with each other and other computers for easy file transfer. Each uses ASCII, the universal language of computer communications so that files can be sent to and received from other computers without modification! The Library also gives you the benefit of a consistent icon and command structure. Once you have learned one program, the others will come easily.

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Who Is Softlaw?

Softlaw Corporation has years of software experience in micros. We currently offer the full-line **VIP Library** for other micros in the U.S. and in Europe. Now we are bringing this experience to the Commodore 64 so you get ultra-high quality software at very affordable prices.

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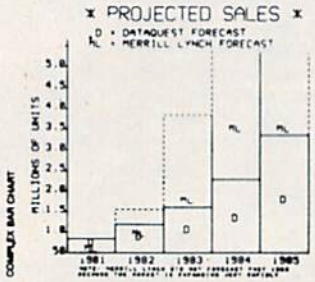
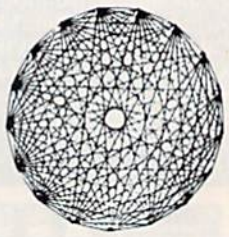


ACTUAL PRINT SAMPLES

UPPER CASE - ABCDEFGHIJKLMNOPQRSTUVWXYZ

LOWER CASE - abcdefghijklmnopqrstuvwxyz



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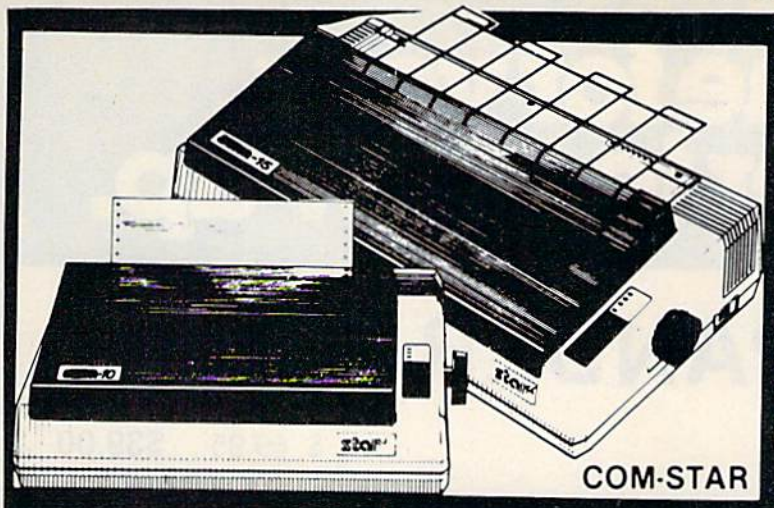

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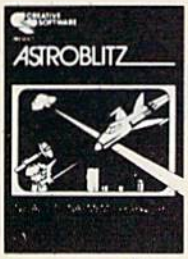

Astroblitz — (Like Defender.) Voted No. 1 computer game overall by Creative Computing! Fantastic copy of an arcade classic. Destroy alien saucers and gun towers while avoiding enemy objects that float by. List $34.95. **Sale $7.95.**

Your Choice

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Was $34.95

Serpentine — Awarding winning game. Avoid hostile red snakes and lay your young while getting food to keep you alive. Fantastic strategy game that has become a classic. List $34.95. **Sale $7.95.**

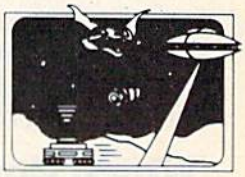
Priced Below Cost

Apple Panic — The fast action computer game hit now comes to the VIC-20. You must dig traps in the brick floor and wait for the wandering apples to fall in.

Then simply beat them on the head to push it through and destroy the apple. Otherwise the apple's will roll right over you and kill you. (Fast action.) List $34.95. **Sale $7.95.**

While They Last

Rat Hotel — Here you get to play the rat. Running and jumping from floor to floor in Hotel Paridisimo you must eat whatever you find but Waldo the maintenance man has set many traps for you that you must avoid. Plus Waldo has an atomic elevator that let's him jump several floors at once. See if you can get to the bottom before Waldo does you in. Fantastic graphics and sound. List $34.95. **Sale $9.95.**



Terraguard — Your mission is to destroy the aliens before their ship has a chance to land. Move your base along the ground and shoot up at them. List $34.95. **Sale $9.95.**

Video Mania — You're in an open field and strange alien creatures are roaming all over. If you stand still too long, they'll collide with you, causing instant annihilation. Your only defense is to destroy them by throwing your electronic, football-shaped alien zapper at them. **Sale $9.95.**

Spills & Fills — How much is too much? How much isn't enough? With this original concept educational game designed for grade schoolers through high school students, you can develop ratio and perspective skills. With three exciting and challenging skill levels, this program presents new and ever-changing challenges for the inquisitive mind. **Sale $9.95.**

Trashman (Better than Pacman). Dash for the trash and pick up CASH!!! List $29.95. **Sale $9.95.**

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One-Touch Keywords

Mark Niggemann

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The less time spent typing, the more time you have for programming. "One-Touch Keywords" lets you use any of the letter keys in combination with either the SHIFT or Commodore key to instantly print a BASIC keyword on the screen. For example, instead of typing GOSUB, you can hold down SHIFT and press G, and GOSUB will appear as if you had typed the whole statement. See the table for a list of all the keywords available.

Which Computer?

This utility works on both the VIC and 64. It initially detects which computer is being used and then modifies itself as necessary. These modifications are POKEd right after the relocation adjustments.

To detect which machine the program is running on, PEEK 65532, a ROM address. If this location contains a value of 34, the program is being run on a VIC. Otherwise, it's on a 64. This is an easy way to detect which machine you are working with and can be used in any program designed to work on both the VIC and 64.

A final checksum routine (lines 710–750) is included to aid in finding any errors in the machine language data. After you run the program once, type RUN 700 and the program will check your typing. Recheck the DATA statements if you get an error message. This final checksum is added insurance to the line-by-line checksum provided by the "Automatic Proofreader."

Activating The Keywords

The program is a BASIC loader which moves the machine language from DATA statements into the upper part of free memory. It also protects the machine language from interference by BASIC.

To activate the machine language, you must type SYS followed by the number given as the on/off address, then press RETURN. The one-touch keywords will remain enabled even after the RESTORE key has been pressed. To disable the keywords, SYS the on/off address again.

See program listing on page 175.

Keywords

Key	SHIFT	Commodore
A	PRINT	PRINT#
B	AND	OR
C	CHR$	ASC
D	READ	DATA
E	GET	END
F	FOR	NEXT
G	GOSUB	RETURN
H	TO	STEP
I	INPUT	INPUT#
J	GOTO	ON
K	DIM	RESTORE
L	LOAD	SAVE
M	MID$	LEN
N	INT	RND
O	OPEN	CLOSE
P	POKE	PEEK
Q	TAB(	SPC(
R	RIGHT$	LEFT$
S	STR$	VAL
T	IF	THEN
U	TAN	SQR
V	VERIFY	CMD
W	DEF	FN
X	LIST	FRE
Y	SIN	COS
Z	RUN	SYS

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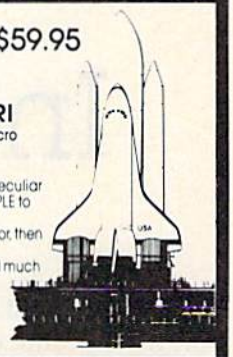

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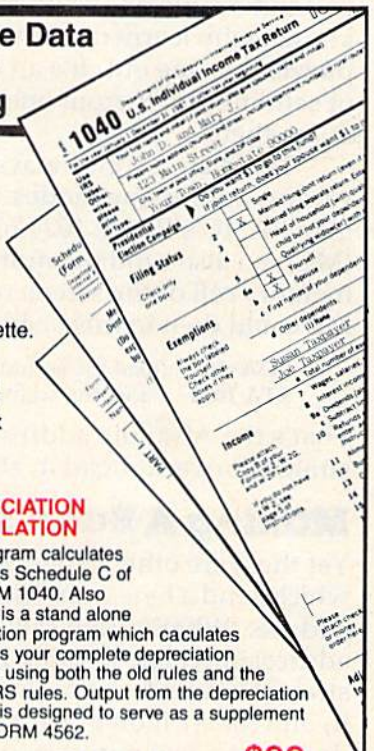

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MACHINE LANGUAGE FOR BEGINNERS

RICHARD MANSFIELD, SENIOR EDITOR

Indirect Addressing

This month we'll take time out to answer a question which came in the mail:

Q: I hope you'll go over indirect indexing again. Why is it important? I found it hard to absorb at first.

A: Everyone does. It's one of those things which—once you know how to do it—is easy to use and even obvious. But everyone I've ever known who learned machine language has had to puzzle this one out. It's an *addressing mode*, a way of sending a byte from one place in the computer to another.

There are various ways to send these bytes, various addressing modes you can choose from. Like BASIC's POKE 1024,65, machine language (ML) can also send the number 65 to the first RAM memory cell of the screen on a Commodore 64. ML could do it in this fashion:

```
LDA #65    (load the accumulator with 65)
STA 1024   (store the accumulator at address 1024)
```

That's the Absolute addressing mode. It's straightforward. Load it, store it.

Making A Bank Shot

Yet there are other ways, other addressing modes, which send a byte from the accumulator to a target address. What's often called Indirect Indexed addressing (I like to call it Indirect Y) is not as straightforward as Absolute addressing. You load it, and *bounce* it off a *zero page pointer*. This idea does take a few minutes to learn, but it's a fundamental and very powerful ML programming technique. You should study it, play with it until you master it. It's like a bank shot in basketball: you make a basket by bouncing the ball off the backboard. In other words, it's an *indirect* shot:

```
LDA #65
LDY #0
STA (253),Y   (253 is a zero page backboard off which
               the 65 bounces. Such two-byte, zero page locations
               are called pointers.)
```

The confusing part is how 253, even enclosed in parentheses, sends that 65 up to 1024. The parentheses and the ,Y are just symbols that alert an assembler program to use the Indirect Y addressing mode. An assembler is to machine language what BASIC is to BASIC programs: it interprets and creates a series of instructions that the computer can follow.

But why 253? What's special about this zero page address that causes bytes to go to 1024 instead of 5000 or 8992? The answer is that Indirect Y addressing is a two-step process: First you must put the target address (1024 in our example) into whatever two bytes in zero page that you plan to use as a pointer. In other words, you put the 1024 into addresses 253 and 254 *yourself* before you can STA (253),Y and have bytes bounce up to 1024.

Position Matters

So far, so good. But how do you set up an address pointer? The 6502 chip expects all such addresses to be stored into *two consecutive bytes* and it wants the *higher byte in memory* of this pair to hold a number that is to be multiplied by 256. The lower byte in memory will hold any remainder left over after the multiplication. Thus, in our example above, the number in cell 253 will be the remainder and the number in 254 will be what's multiplied by 256. The position of the two numbers in the pointer is important. How would you set up a pointer to hold the address 15? It would be: 15 0. Nothing is multiplied by 256. How about storing the number 1024?

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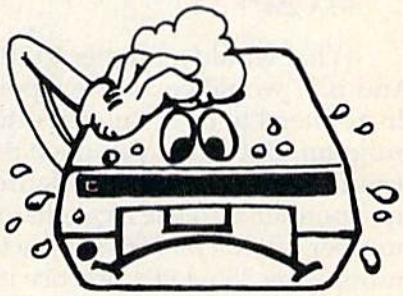

Most of them are, you know. Commodore makes a great disk drive. Only trouble is, they suffer from read and write problems frequently. And almost always, it means a trip to the shop for a head alignment. Maybe you can afford to have your drive out of commission for a while. And to pay to have your drive repaired. But we've been told that most of these problems occur because the drive has overheated, throwing the head out of alignment because of parts expansion.

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Preparing The Pointer

To set up any address pointer, you first divide the number by 256 to get the higher byte (usually called the "most significant byte," or "MSB"). 1024/256 = 4. So 1024 would be stored: 0 4. There is no remainder in this case. That is, address 253 above would contain a 0 and address 254 would contain a 4. Using an assembler, you would set up this pointer by:

```
LDA #0   (Load A with the LSB, the least significant
         byte)
STA 253
LDA #4   (the MSB)
STA 254
```

What would a pointer to 1025 look like? 1 4. And 1027 would be 3 4. Such pointers, fortunately, do not need to be calculated often in a normal ML program. But when you need them, they're quite useful. The easiest way to figure out how to set up a pointer is to use a calculator. Put in the number, divide by 256, subtract the integer, and multiply by 256. Let's practice it:

Enter 1027 and then divide it by 256. You get 4.01171875. The *integer*, the whole number to the left of the decimal point, the 4, is our MSB. Jot it down. Then subtract it from the answer to leave the fractional part, .01171875. Now to get the LSB, just multiply this fraction by 256. There's the 3.

On most calculators, you'll need to enter 1027 ÷ 256 = – 4 = X 256 =.

By now, all this bother seems hardly worth it. Why not just LDA 65:STA 1024? If that one load and store is all you're doing, Absolute addressing is the easier and faster way. On the other hand, loops and such greatly benefit from the Indirect Y addressing mode. What if you wanted to check the first 256 screen RAM cells for the letter A? It would be swift and effective to store 0 and 4 into 253 and 254 and then:

```
1000 LDY #0
1002 LDA (253),Y
1005 CMP #65   (is it the letter A?)
1007 BEQ 1020  (if so, go do something in response)
1009 INY  (otherwise, raise the index and look at the
     next cell)
1010 BNE 1002  (branch back to the start of the loop
     unless Y resets to zero.)
1013 do something here which shows that no A was
     found.
...
1020 do something here which shows that we did find
     an A.
```

Notice the INY. It's the secret of the power of Indirect Y addressing. The value of Y is added to the pointer. Therefore, you can address any cell within a 256-byte range by just changing the value of Y. 1024 becomes 1025, 1026, 1027...quickly, with each INY. DEY would work in the opposite direction.

200 LDAs

Imagine using Absolute addressing to accomplish this same task:

```
1000 LDA 1024
1003 CMP #65
1005 BEQ 990  found it, so branch.
1007 LDA 1025  didn't find it, so keep on looking.
1010 CMP #65
1012 BEQ 990
1014 LDA 1026...and so on, 198 more times!
```

One final note: You can't use just any zero page pair of memory cells to store your pointers. You have to share this first 256 bytes with your 64 or VIC's BASIC and with its operating system. They put their pointers into zero page for the same reason that you will.

If you don't use a tape drive, locations 165–177 are safe to use. Even if you do use tape, you can store things there if you don't load or store anything to or from tape while the ML program is *running*. Most of the ML you'll write won't involve loading or storing during the execution of a program anyway, so 165–177 are normally available. And addresses 251–254 are always safe.

If you have any questions or topics you'd like to see covered in this column, please write to: Machine Language For Beginners, P.O. Box 5406, Greensboro, NC 27403.

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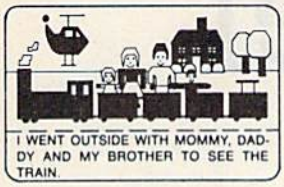

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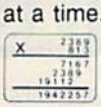

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File Copier

Martin Engert

"File Copier" is a BASIC utility that lets you transfer files from one disk to another using a single drive without worrying about starting addresses or machine language. For the VIC-20 and Commodore 64.

"File Copier" can help those who want to copy sequential or program files from one disk to another, but have only a single disk drive and no machine language monitor. Since the program is written in BASIC, it's a bit slow. But one advantage of this program over a machine language monitor when transferring machine language programs is that you don't have to know the initial address or length of the program to be transferred.

File Copier works on both the VIC-20 and Commodore 64. The program first resets the top of BASIC pointers to reserve 1K of memory for itself. The remaining memory is used to store your file temporarily. VIC users should make sure enough memory is available for this purpose before running the program. Any amount of expansion memory can be added if necessary. Each byte of your file is then read from disk using the GET# command and POKEd into free memory. Then you insert the new disk and the program writes these bytes onto it using PRINT#. After the file is copied, the top of BASIC pointers are restored to normal.

Screen instructions are provided within the program for easier use.

File Copier

```
10 POKE251,PEEK(52)                    :rem 49
20 POKE52,PEEK(44)+4:POKE56,PEEK(52):CLR
                                       :rem 89
30 PRINT"{CLR}RUN THIS PROGRAM TO"
                                       :rem 175
40 PRINT"COPY A PROGRAM OR"            :rem 106
50 PRINT"SEQUENTIAL FILE FROM"         :rem 133
60 PRINT"ONE DISK (THE SOURCE"          :rem 30
70 PRINT"DISK) TO ANOTHER (THE"        :rem 73
80 PRINT"DESTINATION DISK)."           :rem 253
90 PRINT"INSERT SOURCE DISK."           :rem 57
100 M=256*PEEK(52)                     :rem 191
110 OPEN15,8,15                        :rem 32
120 PRINT"WHAT IS THE NAME OF"         :rem 203
130 PRINT"THE FILE OR PROGRAM":INPUTF$
                                       :rem 83
140 T$="P":PRINT"WHAT IS THE FILE TYPE"
                                       :rem 252
150 PRINT"(P FOR PROGRAM, S FOR"       :rem 68
160 PRINT"FILE)"                       :rem 177
170 INPUTT$                            :rem 160
180 OPEN2,8,2,F$+","+T$+",R"           :rem 128
190 INPUT#15,E,E$,X,X:IFE<>0THENPRINTE$:C
    LOSE2:GOTO120                      :rem 134
200 GET#2,A$:IFA$=""THENA$=CHR$(0):rem 90
210 POKEM+J,ASC(A$):J=J+1:IFST=0THEN200
                                       :rem 66
220 CLOSE2                             :rem 60
230 PRINT"INSERT DESTINATION"          :rem 125
240 PRINT"DISK AND PRESS {RVS}RETURN"
                                       :rem 228
250 PRINT"TO COPY."                    :rem 116
260 GETC$:IFC$<>CHR$(13)THEN260         :rem 6
270 PRINT"PRESS {RVS}RETURN{OFF} IF YOU"
                                        :rem 7
280 PRINT"WANT TO KEEP THE NAME"       :rem 111
290 PRINTF$                            :rem 146
300 INPUT"FILE NAME ";F$                :rem 77
310 OPEN2,8,2,F$+","+T$+",W"           :rem 128
320 INPUT#15,E,E$,X,X:IFE<>0THENPRINTE$:C
    LOSE2:GOTO300                      :rem 129
330 FORK=0TOJ-1:PRINT#2,CHR$(PEEK(M+K));:
    NEXT                                :rem 7
340 CLOSE2:CLOSE15                     :rem 85
350 POKE52,PEEK(251):POKE56,PEEK(251):CLR
                                       :rem 145
```


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Appending Sequential Disk Files

John S. Winn

If you've discovered a clever, timesaving technique, or a brief but effective programming shortcut, send it to "Hints & Tips," c/o COMPUTE!'s GAZETTE. If we use it, we'll pay you $35.

Sequential files are lists of things—phone numbers, addresses, names, or other data—kept on a disk. They are similar to tape files (which are also sequential) because they keep the information in the same order it is entered. The first item written into the file will be the first one to come out when a program reads the file.

It's easy to write BASIC programs to construct such lists. But how do you add new information to the end of a sequential file?

The 1541 disk drive user's manual suggests two possible solutions. The first is to read the whole file, add the new data, and write the file out again. The longer the file, the more time it takes, which can be rather annoying. Or, perhaps you could switch to random access files, at a considerable cost in programming effort.

A simpler method is available, but it's not mentioned in the user's manual, and thus is not widely known. The operating system on Commodore's PET and CBM series (with BASIC 4.0) includes an APPEND command. The VIC and 64 versions of BASIC do not recognize this command, but your 1541 disk drive does. And it's simple to use.

Normally, when you want to write a sequential file, you use OPEN 1,8,8, "filename,S,W" (the S means Sequential and W means Write). To read the file, replace the W with an R. The method for appending uses a similar form. If you want to add to a file which already exists, just use OPEN 1,8,8, "filename,A" (A for Append).

The following short programs demonstrate this useful command. First we'll write a new file containing the first ten letters of the alphabet.

```
10 OPEN1,8,8,"ALPHABET,S,W"
20 A$="ABCDEFGHIJ"
30 FORJ=1TO10
40 PRINT#1,MID$(A$,J,1);
50 NEXT
60 CLOSE1
```

RUN the program. The red light on your drive should blink on, indicating the file is being written. Then, append to this file the next ten letters of the alphabet, using the A (Append) in the OPEN statement. Change lines 10 and 20:

```
10 OPEN1,8,8,"ALPHABET,A"
20 A$="KLMNOPQRST"
```

RUN the program again and the new data will be added to the file. Now read the file to doublecheck that the technique worked. Type NEW and enter this short program.

```
10 OPEN1,8,8,"ALPHABET,S,R"
20 FORI=1TO20
30 GET#1,A$
40 PRINTA$
50 NEXT
60 CLOSE1
```

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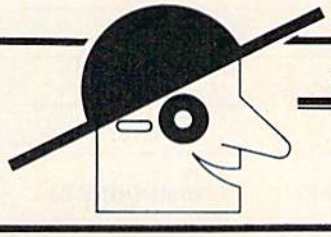

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When you RUN this program you should see all 20 letters on the screen. It works.

There are a couple of things you should be aware of when you use this new command. First, you cannot use the A command to open a file for the first time. The file must already exist—you have to use OPEN1,8,8"filename,S,W" before appending. If you want to, you can create an empty file with a CLOSE1 immediately after the OPEN statement. You can then use the A command within your BASIC program.

Second, if you use a lot of appends, disk space can be used up more quickly than normal, due to a quirk in the append command. Think about the file created by the two programs above. It is short (containing only 20 characters) and should use only one block on the disk. But if you call up the directory (LOAD"$",8 followed by LIST), you will notice that ALPHABET uses two blocks. This is because the A command puts the new data at the beginning of a brand new block. Even if you append only one item, it will use up a whole block. If you append often, you may start to lose free disk space.

The answer to the second problem is to read in the whole file, scratch the old sequential file, and write a new one, a process we originally wanted to avoid. But at least you won't have to do it every time you append.

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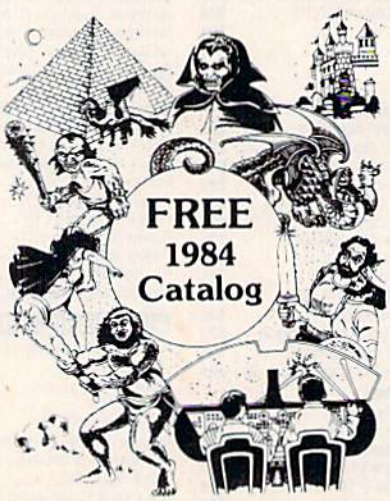

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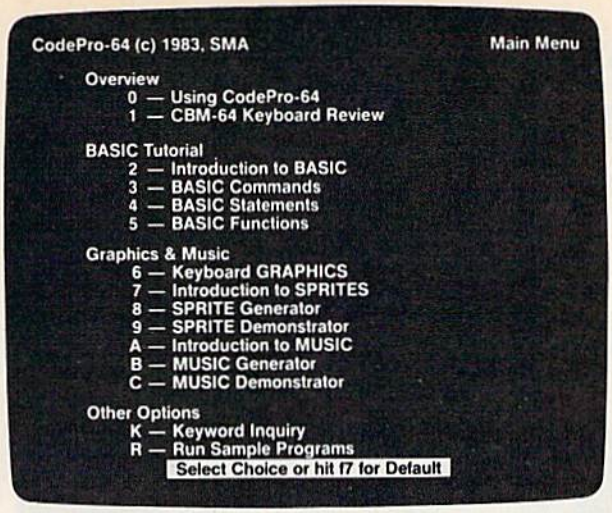

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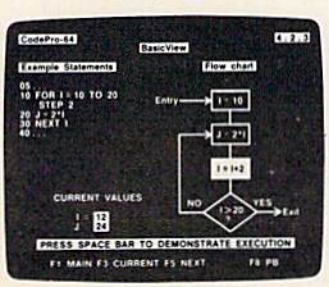

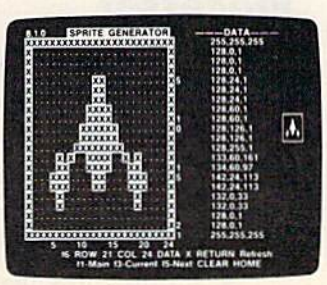

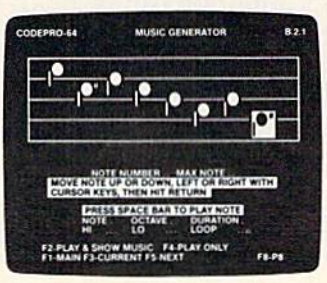

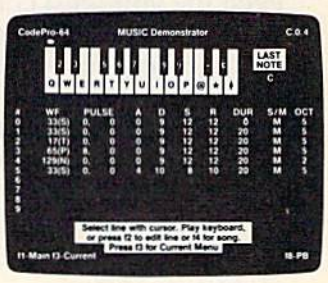

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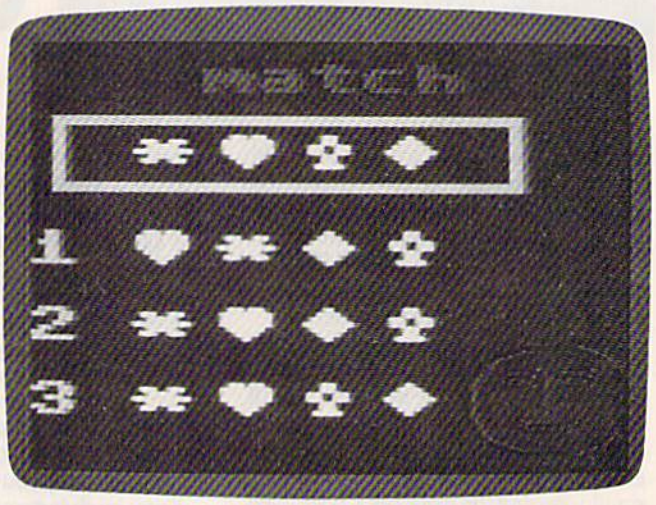
Dan Carmichael, Assistant Editor

Software For The VIC

In this month's column, we'll look at some new games and educational programs for the VIC-20.

Commercial software for the VIC-20 has decreased as of late. That is not to say that the popularity of the VIC has also lessened. Nor does it indicate that support for the VIC is waning. With the introduction of the Commodore 64 and other computers, a greater area is being covered by software companies. However, there are still many good games, educational programs, and applications being offered for the VIC. We'll look at a few of the better ones here.



The Match option from Kindercomp.

Educational Programs

Type Attack, from Sirius Software, is a novel typing tutor program. Usable by all ages, it teaches letter recognition and keyboard familiarity. Because the typing speeds can be set from 1 to 99 words per minute, *Type Attack* can help improve the techniques of novice and expert typists alike.

The program contains three lesson options: Character Attack, Word Attack, and Lesson Maker. Character Attack teaches character recognition, Word Attack teaches word recognition, and the last option allows you to set up your own lessons.

Type Attack offers more than many other typing tutors in that it plays like a game. You learn and have fun at the same time. Based on a Space Invaders theme, the letters and words drop from the sky. The player blasts them (and defends the earth) by pressing the appropriate key or keys. The action can become so fast and furious that even the youngest child's attention can be held. If your software needs include a typing tutor, I strongly recommend this one.

Kindercomp, from Human Engineered Software, is a collection of learning games for children ages 3 to 8. Four of the games are Names, Sequence, Letters, Match.

Names allows you to type in the child's name, which is then displayed on the screen a number of different ways.

Sequence presents a line of numbers in sequential order followed by a question mark. The child is then asked to supply the next number in the sequence. A right answer is rewarded with a smiling face, and three correct answers in a row produce a colorful screen display with sound.

Letters displays a single letter on the screen, then asks the child to type the same letter on the keyboard. Right answers are rewarded with colors and sounds.

Match familiarizes the child with shapes and patterns. A pattern of three shapes appears in a box. The child is then asked to identify the pattern by matching it with one of three choices.

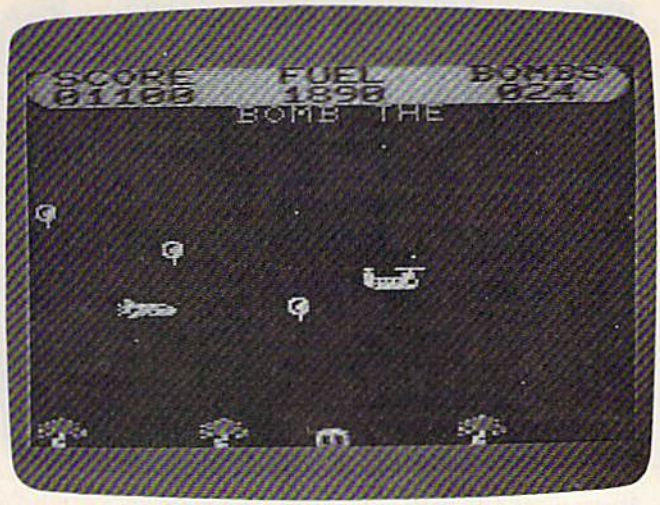
All of the games feature good color and sound to hold the child's attention.

A Full-Featured Word Processor

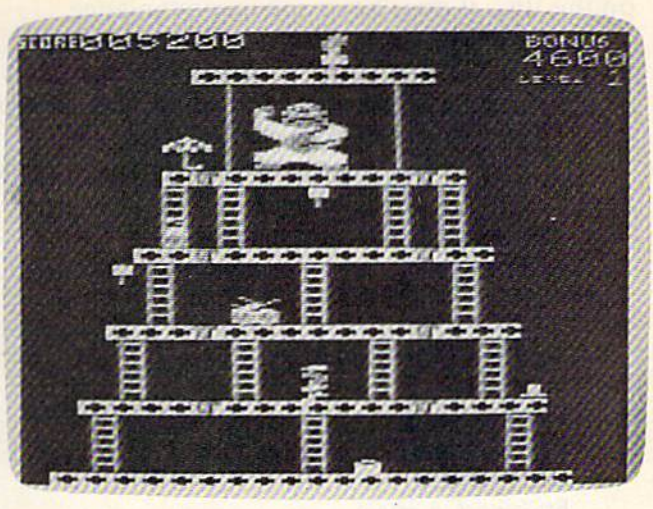
Write Now!, from Cardco, is a word processor for the unexpanded VIC. It contains many of the options you'd expect to find in word processors designed for computers more powerful than the VIC.

The program is on cartridge, so there's no handling of fragile diskettes, or lengthy tape cassette loads. Other advanced features include:

- Multiple line headers and footers.
- Ability to save text to tape or disk.



Skyblazer *offers good graphics and fast action.*



An arcade classic for the VIC, Donkey Kong.

- Options for sending special printer codes.
- The ability to recall frequently used passages and insert them into your text.
- Text scrolling up or down.
- Easy insert and delete modes.
- Block commands including copy, move, and delete.
- Global search, which allows you to find and replace any string.
- Optional page numbering at the top or bottom of the page.
- Instruction booklet and a 30-minute audio cassette instruction course.

All you need is a disk drive or cassette (if you wish to save the text).

Games

There seems to be no shortage of games on the market for the VIC. Some of them bear no mention. However, there are many that play well and offer hours of challenging fun. Here are a few of them:

Skyblazer is a "defender" type of game. It offers smooth horizontal scrolling plus good graphics. And there's plenty of action.

The object of the game is to successfully complete the five missions, or game levels. The first level puts you on a bombing run to destroy enemy radar. Once this is destroyed, your next missions include attacking the enemy tank and ICBM defenses. After you've destroyed the primary defenses, the final challenge is to destroy the enemy headquarters. And that is not easy.

Skyblazer contains good graphics and sound. Also included are options to pause the game, or adjust the positioning of the screen display. Available on cartridge, all that is needed is your VIC and a joystick.

Donkey Kong, from Atarisoft, is a relatively accurate version of the arcade classic. The object of the game is to guide Mario through the steel girders and rescue his girlfriend from the clutches of a gigantic gorilla.

The game offers four different levels of play. While climbing upward, you must avoid the rolling barrels, firefoxes, mad springs, and cement piles. Grabbing the magic hammer allows you to smash the rolling barrels.

The game is challenging, and the colors, sound, and smooth graphic animation make it a fun game for the VIC. *Donkey Kong* is available on cartridge and requires a joystick.

Lazer Zone is a fast-paced shoot-'em-up game. The object is to fend off the attacking Warfiends of Zzyzax. You're armed with two rapidly firing cannons. The cannons are located at the bottom and the side of the screen and each moves and fires independently. Maneuver each cannon to shoot and destroy the invading Zzyzaxians.

Although the game is simple in theory, it's fun to play. The action is nonstop, and the sound effects are very good.

Lazer Zone is available on cartridge.

Capture the Flag, from Sirius Software, is a unique game in which you maneuver through a maze to capture your opponent's flag. But this is not the usual maze game. Instead of viewing the field of play from the top, you see it from ground level. This produces an interesting 3-D effect as you work your way through a maze of walls towering over your head.

Game options include a pause control and a feature which allows you to toggle the labyrinth maps on or off. You can also choose to play defense (protect) or offense (capture). You may also choose your opponent—a friend or the computer.

Although the 3-D screen display and the game action make this one of the best games I've seen

on the VIC, it does have one inconvenience. Dreary music plays throughout the game, and the instruction manual offers no way to switch it off. The music gets monotonous after a while, but you can always turn your volume down.

Capture the Flag is on cartridge and requires a joystick.

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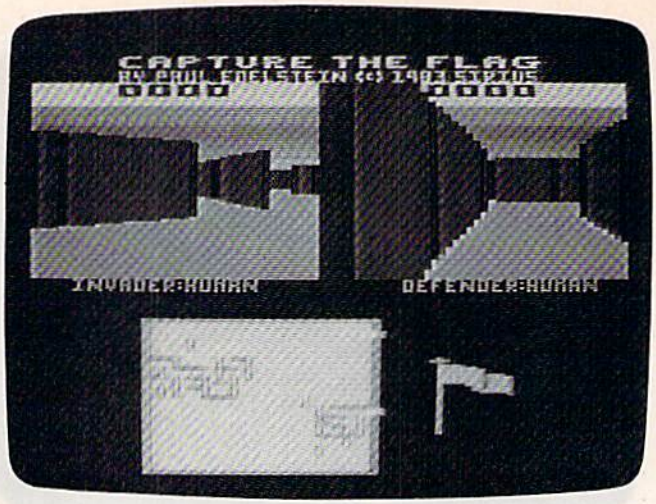

An excellent 3-D effect in Capture The Flag.

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Unlocking the power of computing

Scroll 64

Peter Marcotty

A window can make a static screen more dynamic. This short machine language routine gives you control over screen scrolling from within BASIC programs.

Someone spots a tornado and reports it to the local weather bureau. Your television beeps and a warning moves across the bottom of the screen.

How would you create that effect on your 64? How do you make words scroll sideways?

Scroll Control And Windows

When you LIST a program, the screen fills quickly. As new lines appear, the screen scrolls from bottom to top (everything moves up a notch).

But there may be times when you want movement from top to bottom, or right to left. Or perhaps you want some information to stay in one section of the screen while everything else moves.

You need a screen window. Things in the window move, while everything else stays put. Some new computers, such as the Apple Macintosh, have built-in windowing.

"Scroll 64" won't turn your 64 into a Macintosh, but it can make your screen displays more dynamic.

Asteroid Belts And Invoices

There are many ways to creatively use screen windows and scrolling. For example, scrolling is common in certain types of video games. You drive a car on a road that moves toward you. Or your spaceship at the bottom of the screen has to shoot at descending asteroids. In addition to the action window, there is usually a section with information about your current score, remaining fuel, velocity, and so on. It would be confusing if your score moved with the asteroids, so the action of the game is put in a window. Your score goes somewhere outside the window.

Business programs can benefit from windows, as well. You might want a command line in an invoicing program, to remind the user of the various options. The window would cover all of the screen except the last line, which says "F1 = Help F3 = New F5 = Help F7 = Continue." Everything scrolls on the screen except the line at the bottom. Another possibility is a product list window in the corner of the screen. When the user of the invoice program wants to look up a product number, the window opens up and the list scrolls by.

Customizing Your Programs

Scroll 64 is a machine language program which goes into memory locations 49152–49528 ($C000–$C172). It does not use any BASIC RAM. The BASIC loader program reads the DATA statements and POKEs the numbers into memory. When the ML program is safe in memory, type NEW to get rid of the loader and clear RAM.

To use it, LOAD and RUN Scroll 64, type NEW, and then LOAD your own program. To activate it, simply SYS 49152. It scrolls once and returns to BASIC.

Or, if you prefer, you could build the BASIC loader into your program. Renumber the lines (starting at 60000, for instance), add a RETURN, and call it with a GOSUB at the beginning of your program.

Scroll 64 moves a certain section of the screen in a certain direction, along with the corresponding color memory. These memory addresses contain the pertinent information:

LOCATION	FUNCTION
49522	Direction
49523	Left Boundary
49524	Right Boundary
49525	Top Boundary
49526	Bottom Boundary
49527	Horizontal Wrap
49528	Vertical Wrap

Direction is the way in which the screen scrolls. To change it, POKE 49522 with one, two, three, or four (for left, right, up, or down respectively). The boundary values define the size of the window. Left and right boundaries can range from 0 to 39. Top and bottom must be between 0 and 24. When the program is first run, a five by five window goes in the top left corner.

The wrap values determine what happens to characters when they reach the edge of the window. You can make them disappear or wrap around to the beginning. POKE 49527 and 49528 as follows:

Number	Effect
0	Don't wrap around, leave a trail
1	Wrap around
2	Don't wrap around, erase trail

To activate the scroll window, SYS 49152. You can SYS over and over, changing the direction, boundaries, and wrap values as you wish. Note that when the ML routine is activated, whatever is in the window scrolls, but at all other times, the screen acts as it normally does.

Special Loading Instructions

Enter the program and SAVE it before you test anything. To put the ML into memory, type

```
RUN 60
```

The computer will take a few moments to complete the POKEs. As added insurance, there is a checksum routine built in. Type RUN and the values in memory are checked. If an error message appears, check the DATA statements. Block 1 includes lines 5010–5050, block 2 includes lines 5060–5100, and so on. If you find a mistake, fix it and type RUN 60 followed by RUN. Remember to SAVE the final, debugged version.

There is one thing to watch out for. If you decide to use a single line for your window, you can scroll left or right, but don't try to move up or down. For example, if you set the top boundary to five and the bottom to five, you can scroll line five to the left or to the right. But try to scroll up and the computer crashes. And you cannot escape the crash with RUN/STOP–RESTORE. You have to turn your computer off and then on again (and lose whatever you have in memory).

Smoother Scrolling

Regular scrolls move whole characters. It's like picking up a letter and dropping it down one line.

The 64 can do smoother scrolls, moving characters a pixel at a time. The key is memory locations 53270 (horizontal) and 53265 (vertical). To do smooth scrolls, use these formulas:

```
POKE 53270, (PEEK(53270)AND248)+X
POKE 53265, (PEEK(53265)AND248)+Y
```

X and Y can be any numbers from 0 to 7. Once you've gone to 7 or 0, you'll have to do a regular scroll and reset the smooth scroll to the other limit. Smooth scrolling can make an action game look more realistic—the characters don't jump around, they slide.

A minor annoyance in this method is that while the screen is doing a smooth scroll, you may see small gaps at the edges. You can get around this by turning off bit 3 of these two registers; in the POKEs above, AND with 240 instead of 248. In effect, you pull the border in a notch, resulting in a 38 column by 24 row display (instead of 40 x 25).

Because smooth scrolling affects the whole screen, it is not compatible with Scroll 64 windows. If you combined the two, you would see smooth scrolling inside the window and jittery, vibrating characters outside the window. To fix this would require a high-res screen, customized word sprites, or a raster interrupt wedge.

See program listings on page 176.

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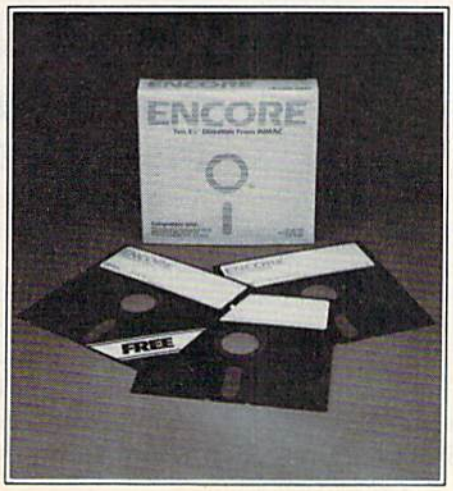

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Tape Data Files For VIC And 64

Brian Prescott

Storing information on tape files can free up memory for BASIC. The sample programs presented here show how to set up, write to, and read from tape files.

Beginning programmers often balk at writing and reading files to the Datassette. But some serious applications require the use of the same data in more than one program, or several sets of data with the same program. These situations call for data files.

Here's a trio of simple programs that create data files, read them back, and display the contents. Not only will they help you grasp the techniques, but you can also use them to create files for your programs, or incorporate them into your own programs.

The first two programs create data files. Program 3 reads the files and prints the contents to the screen.

Program 1 prompts you for each item. It then writes the items onto a tape file. This method is convenient, but if an incorrect entry is typed in and stored on tape, the only way to correct it is to create a new file, which means entering all the data again.

Program 2 solves this problem, but is perhaps less convenient. To use it, LOAD the program and add DATA statements at lines 540–570. Running the program creates the files.

Creating A File

The programs are fairly straightforward, but a few comments are in order. The first program asks you for the number of items to be in the file, then DIMensions a string array to hold them. The filename is then requested. It's best to use a name that identifies the file. Using +1 as the filename ends the program. After the array is filled and the file written to tape, the program displays the contents on the screen. You could modify the program to allow display and possible editing before the file is created.

The second program does the same job in a slightly different way. The data lines must be organized properly to avoid problems. The first data item will be read as the filename, so be sure the filename is the first item entered. To signal the end of a file, use –1. This is included at the end of the DATA statements. You can create several files at one time, as you can see from the data included. To signal the end of data, use +1—this stops the program.

To see what's on the files, RUN Program 3. You can ask for any file, but be sure to rewind the tape to some point before the file you want.

Opening, Filling, And Closing Files

A tape file is like a desk drawer. First you open it, put something in or take something out, and then close it.

In the first two programs you will see the statement OPEN 1,1,1, "filename". The three numbers following OPEN serve three different purposes. First is the file number. You can pick any number from 1 to 127, but 1 is most commonly used. The second is the device number. Tape

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drives are always device number 1 (usually the screen is device 3, a printer is device 4, and a disk drive is device 8). The final number is the secondary address. A 1 here means "write to the file." Thus, OPEN 1,1,1 tells the computer to open file number 1 on the cassette drive for writing.

Once a file is opened, you can print to it. In the first two programs, you will see PRINT#1,data. PRINT# works like PRINT, except that if you use keyword abbreviations, a question mark (?) won't work. Use P-shift-R instead, followed by the file number. And you have to put a comma between the file number and the data you are writing. After you finish writing the file, CLOSE it.

Opening a file for reading is similar, except that the secondary address is zero. After the file is open, you can INPUT# or GET# from it. You can read and write any type of data—floating point numbers, integers, or strings.

Since the size of a data file can vary, it is advisable to indicate how long the file is, or where it ends. One method is to PRINT# the number of records as the first item in the file. This is best when you are setting up arrays. The computer reads the first number in the file, then DIMensions the array. Another way to mark the length of a file is to make up an end-of-file marker. In the sample programs, "–1" acts as the marker.

Tape Files On A Disk Drive?

Knowing the basics of tape files is helpful if you decide to buy a disk drive. There are a variety of ways to store information on a disk; one of them is very similar to tape files.

Sequential disk files store information in the order it is received (tape files are always sequential). To transfer information from tape to disk, simply open the tape file for reading, open a sequential disk file for writing, and then input the data from tape, print it to the disk, input more, print more, and so on until you reach the end of the file.

See program listing on page 176.

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VIC 5K Emulator

Glen Reesor

Some programs written for the unexpanded VIC-20 do not run properly when expansion memory is installed. Often the only solution is to switch off or unplug the expander. You can save wear and tear on your memory cartridges by using the technique outlined here, which "emulates" the memory layout of an unexpanded VIC.

Have you ever encountered the problem of upgrading your computer system in such a way that most of your programs need to be modified to operate properly? I had such a problem when I bought a 16K expander for my VIC-20.

When the 8K or 16K expander is in place, screen memory moves from 7680–8185 to 4096–4601, color memory moves from 38400–38905 to 37888–38393, and the start of BASIC moves from 4096 to 4608. Because of these changes, programs written on a 5K VIC that have POKEs to the screen, POKEs to color memory, or high-resolution graphics will not operate properly with an 8K or 16K expander in place.

Some programs use the formula S=4*(PEEK(36866)AND128)+64*(PEEK(36869)AND112) to locate screen memory. Color memory can be located with the formula C=37888+4*(PEEK(36866)AND128). Using these two formulas, some programs written on a 5K VIC will work. However, depending on the length of the program, high-resolution graphics usually will not work.

Simulating An Unexpanded VIC

In order to get all of my programs (approximately 70) to operate with a 16K expander in place, I came up with two alternatives—rewrite all of my programs, or develop a sequence of commands to make my VIC operate like a 5K VIC. Naturally, I decided on the second alternative.

To make my VIC emulate a 5K VIC, I had to change screen memory, color memory, the start of BASIC, and the end of BASIC. Changing the start of BASIC and the end of BASIC was easy; changing screen memory and color memory was the hard part.

I remembered an article, "Alternate Screens" (*Home and Educational* COMPUTING!, Fall 1981), that could change screen memory to 7168–7673 and the color memory to 37888–38393 (for the 5K VIC). The article provided some commands to change the screen memory back to 7680–8185 and the color memory back to 38400–38905. This is exactly where we want the screen and color memory to be.

Now we are ready to change the VIC with an 8K or 16K expander into a 5K VIC.

1. Turn your VIC off and then on.

2. To change screen and color memory, type the following:

```
POKE36866,150:POKE648,30:FORJ=217TO228:PO
  KEJ,158:NEXT:FORJ=229TO250:POKEJ,159:NE
  XT
```

After you press RETURN, the screen will become a mess of various characters and colors. If you do not see this, you probably typed Step 2 incorrectly. Go back to Step 1. If you typed the line correctly, screen memory is now from 7680–8185, and color memory is from 38400–38905 (normal for a 5K VIC).

3. Press RUN/STOP and RESTORE simultaneously to clear the screen and get a cursor.

4. Now change the start of BASIC and the end of BASIC by typing the following:

```
POKE44,16:POKE56,30:POKE4096,0:CLR:NEW
```

The first POKE changes the start of BASIC to 4096 (16*256). The second POKE changes the end

of BASIC to 7680 (30*256). The third POKE puts a 0 at the start of BASIC. On all Commodore machines, there must be a 0 at the start of BASIC for a program to run. "CLR:NEW" clears any variables and any garbage that may have been in the program area.

Your VIC will now operate like a 5K VIC. Almost all programs written for a 5K VIC will now operate properly with an 8K or 16K expander. The only exceptions are those few programs which manipulate these pointers themselves, or which otherwise tinker directly with memory layout. Even many machine language programs will work.

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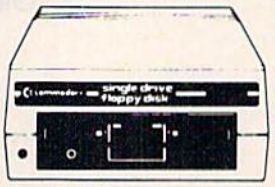

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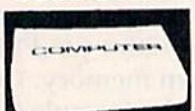

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User Group Update

Kathy Yakal, Editorial Assistant

The Southeast Metro Commodore User Group (SEMCUG) of Portland, Oregon, has been disbanded.

New address for the South Orange County User Group is c/o Steve Wimer, 32221 Alipaz #240, San Juan Capistrano, CA 92675.

The Commodore 64 User Group, Inc., of Glen Ellyn, Illinois, has been disbanded. (New group has been formed; see C-64 User Group, Inc., Lincolnwood, Illinois, in this listing.)

The correct address for the Commodore Preference Users Connection (C.P.U. Connection) is c/o Danni Hudak, P.O. Box 42032, Brook Park, OH 44142.

The Capitol Area Commodore Club can now be reached at P.O. Box 333, Lemoyné, PA 17043.

The VIC-20 User Group of Lincolnton, North Carolina, has expanded to include coverage of the Commodore 64. The new name is VIC-20/64 User Group.

The new phone number for the Commodore PET User Group of Gretna, Louisiana, is (504) 455-4619.

The new address for the North Country Computer Club is c/o Eleanor Cunningham, 1607 Ford St., Ogdensburg, NY 13669. (315)393-2708.

Correspondence for the 64 User Group (formerly of Midnight Circle in Plano, Texas) should be addressed to P.O. Box 801828, Dallas, TX 75380.

The new address for the Quad Cities Commodore Computer Club is c/o Mike Hoeper, P.O. Box 3994, Davenport, IA 52808. (319)242-1496.

The Central Washington Commodore User Group can be contacted at P.O. Box 10937, Yakima, WA 98909.

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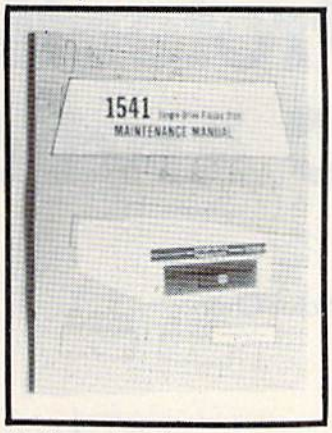

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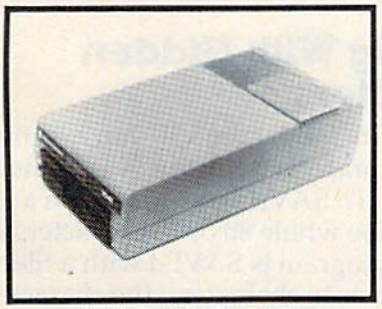

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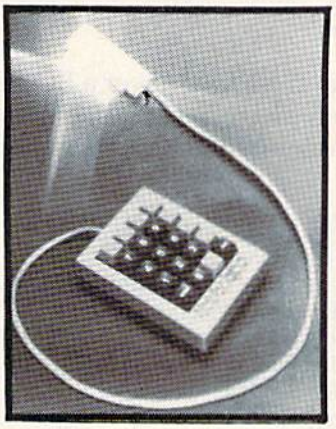

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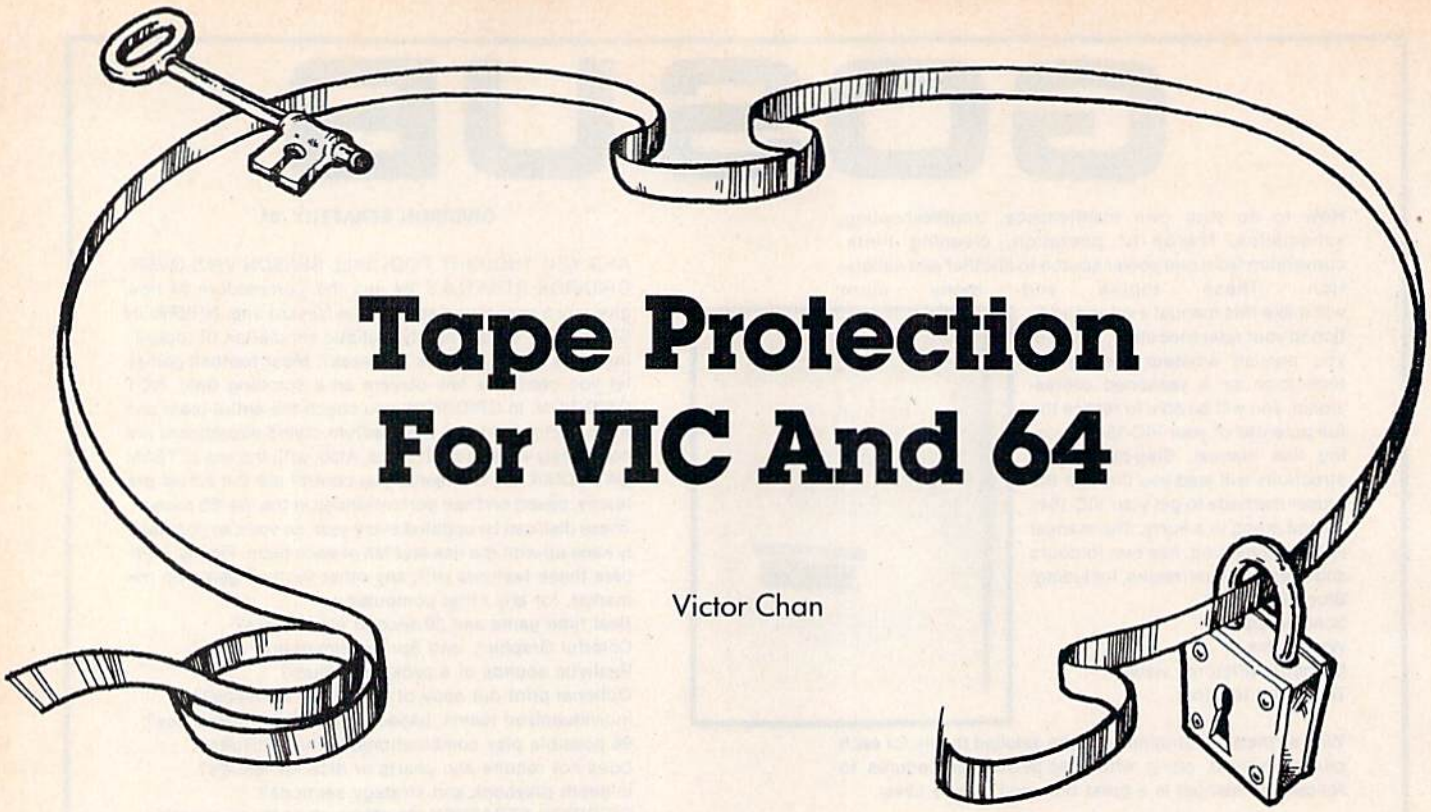

Tape Protection For VIC And 64

Victor Chan

Here are several tricky techniques that allow you to protect your tape programs from being copied.

In the VIC and 64, whenever a LOAD from tape or SAVE to tape is processed, the section of memory known as the tape buffer will be used as follows:

Location	Use
828 ($033C)	Type of tape file
829 ($033D)	Low byte of start address for LOAD/SAVE
830 ($033E)	High byte of start address for LOAD/SAVE
831 ($033F)	Low byte of end address for LOAD/SAVE
832 ($0340)	High byte of end address for LOAD/SAVE
833–1019 ($0341–$03FB)	Program name or filename (padded with spaces to fill the buffer)

When a program is being LOADed or SAVEd, the filename will be stored starting at memory location 833, and the rest of the tape buffer will be filled with spaces. The computer compares the program name with the filename on the tape. A program is *found* on tape when all of the characters of the filename in the LOAD statement are matched. Therefore, being able to find a program does not guarantee that the filename specified in the LOAD statement is the same as that of the filename on the tape.

For example, LOAD "VIC" will LOAD a tape file named VIC, or VIC20, or VICTOR, or even VIC@+=$%@$%.

All that matters is that all of the characters specified in the filename in the LOAD statement are matched. When a program is found during a LOAD, the screen displays only the first 16 characters of the filename. Thus, if a user SAVEs a program according to the name shown on the screen during a LOAD, the file may not be SAVEd with the same filename as the original one on the tape, especially if part of the filename is nonprintable characters. This property of the load statement can be used to prevent unauthorized tape reproduction.

Let's look at three methods of protecting tape files.

SAVEing With Hidden Characters

In immediate mode, the VIC can execute a line of up to 88 characters long; the 64 is limited to 80 characters. To SAVE a program with a long filename, the whole 80 or 88 characters may be used. If a program is SAVEd with a filename that is longer than 16 characters, the characters starting at the seventeenth position are not displayed.

To protect a program, first SAVE the program with a name longer than 16 characters. Then, somewhere in your program, check for one or more of the characters beyond the sixteenth position. If a match is not found, do a SYS to some arbitrary position to crash the program.

Here is an example.

1. SAVE the program you wish to protect with a character in the seventeenth position of the filename:

```
SAVE"NAME{12 SPACES}A"
```

2. Include this subroutine in the program

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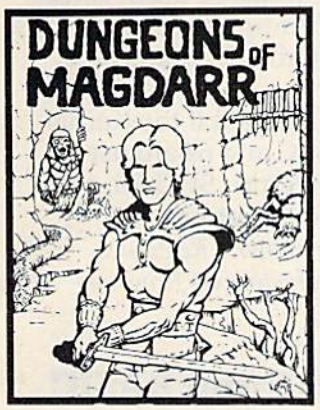

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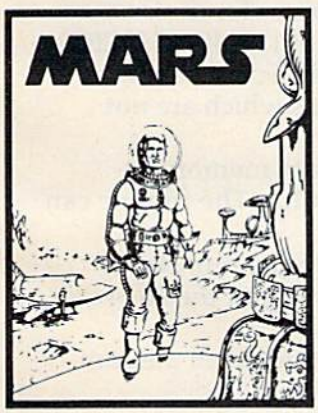

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and execute it with a GOSUB 60000 early in the program:

```
60000 A = PEEK (833+16) : IF CHR$(A)="
      A"THEN RETURN
60010 SYS 833
```

When the program is LOADed, the filename will be displayed as NAME, so if someone attempts to make an unauthorized copy, they will probably use NAME alone. Then, when the program goes to the subroutine at line 60000, it will not find the required A in the seventeenth position.

The SYS 833 (any memory address can be used) will send the computer off to execute a machine language program where no such program exists. This doesn't hurt the computer, but the resulting *lockup* will probably make it necessary to turn the computer off and back on.

SAVEing With Hidden Variables

The method described above checks the contents of a certain memory location in the tape buffer. To provide even more protection, the contents of the location may be used to initialize some variables in the protected program. If the user tries to SAVE without the full filename, the program does not initialize properly and will not run.

For example, if the value of the variable Z is set to 45 in the protected program, include in the SAVE statement the character equivalent of 45 at or after the seventeenth position in the filename. To find out the character equivalent of any number, simply use the BASIC command CHR$, and include this character between the quotes in your SAVE statement. For example, use

```
SAVE "NAME{12 SPACES}-"
```

or simply

```
SAVE "NAME{12 SPACES}"+CHR$(45)
```

Instead of having a line with Z=45 in the program, use Z=PEEK(833+17). This way the program can only run properly with the full filename.

Adding Machine Language To The Program Name

The final approach is the most complicated. It requires the use of machine language. You use part of the filename portion of the tape buffer to hold a machine language subroutine. Again, the program cannot run properly unless the program is SAVEd with the original name. To use this method, put a SYS somewhere in the protected program which calls the subroutine in the tape buffer. If the subroutine is not there (if the program was not SAVEd with the original filename, including the machine language portion), the program will probably crash when it attempts to execute the contents of the tape buffer as machine language.

It would be a tedious process to calculate the CHR$ equivalent of every byte in the ML routine and type the corresponding characters as part of the filename. Also, only a portion of the available 171 bytes (locations 849–1019) could be used, since the length of the filename (including the SAVE command and quotes) is limited to 88 characters on the VIC, 80 on the 64.

These limitations can be avoided if the Kernal ROM routines built into the VIC and 64 are used. The required routines are SETNAM, SETLFS, and SAVE. For information on these routines, see Chapter 3 of the *VIC-20 Programmer's Reference Guide* or Chapter 5 of the *Commodore 64 Programmer's Reference Guide*.

Using The Registers From BASIC

These ROM routines all require that values be placed into the microprocessor's A, X, and Y registers, which can be done directly only with ML programming. The key to using these routines without resorting to ML is knowing that values POKEd to location 780 will be loaded into the A register, location 781 will be loaded into the X register, and location 782 will go into the Y register.

As an example, the following steps illustrate one way to use the Commodore 64 Kernal routines to SAVE a BASIC program from memory to tape with a machine language subroutine as part of the filename:

1. POKE the character values for the desired program name into locations 49152–49167 ($C000–$C00F). POKE the value for the space character (32) into any of the 16 locations which are not used.

2. Load the ML routine into memory beginning at location 49168 ($C010). The routine can be up to 171 bytes long.

3. POKE location 780 with the number of bytes in the ML routine, plus 16 (for the 16 bytes in the name).

4. Use the SETNAM routine to tell the computer where to find the filename:

```
POKE 781,0:POKE 782,192:SYS 65469
```

The POKE values given are for a filename starting at location 49152 (256*192+0=49152). These values must be changed if the filename is at some other point in memory.

5. Use the SETLFS routine to specify that a SAVE is to tape:

```
POKE 780,1:POKE 781,1:POKE 782,255:SYS 65466
```

6. Use the SAVE routine to store the BASIC program on tape. The data in the section of memory defined in Step 4 will be copied into the tape buffer and used as the filename:

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If your protected program includes a SYS to the ML in the tape buffer, it will work properly only if the program has been SAVEd in this manner, so the chances of someone breaking this protection scheme are very slim.

Using any one or a combination of the three different levels of difficulty described should reduce unauthorized tape reproduction.

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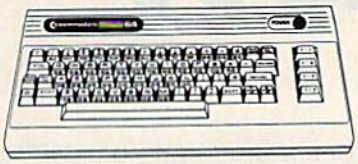

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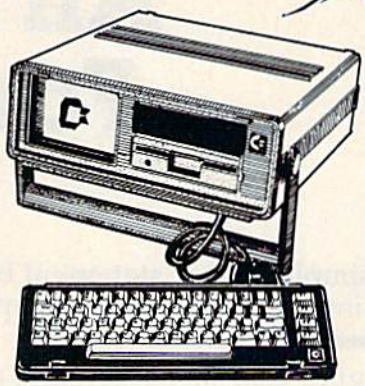

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All About PRINT For VIC And 64

Julie Harris

The simple PRINT statement becomes a drawing tool in this screen graphics tutorial.

The PRINT statement was one of the first BASIC statements you learned when your computer was so new it still gleamed. You may be interested in more complicated routines now—reading joysticks, creating your own graphics characters, or writing machine language. But the humble PRINT statement still has something to offer.

You can use PRINT in a generalized subroutine that draws pictures using the keyboard graphics characters. PRINT is useful if you want to manipulate graphics characters as if they were in a variable-length array. However, this won't use the storage space required for arrays. Or, you can PRINT an unending series of pictures, each unique, and never run out of memory.

Let's begin with a review of some basic characteristics of the PRINT statement.

Commas And Semicolons In PRINT Statements

When a PRINT statement ends with a semicolon, the next character printed will appear in the next horizontal screen location. For example, PRINT "THREE": PRINT "DIFFERENT": PRINT "LINES," will print

```
THREE
DIFFERENT
LINES,
```

but PRINT "ALL ";: PRINT "ON ";: PRINT "ONE." will print

```
ALL ON ONE.
```

In the example above, each word ends with a space. If you left out the spaces, you would see something like this: ALLONONE. Using a semicolon after a PRINT tells the cursor to stay put. If you forget to include the spaces, the words run together.

The rules are slightly different when you PRINT numbers. Try PRINT1;2;3 and you will find that each number has a space on either side. Whenever you PRINT a number, a trailing space is automatically added and the space in front is reserved for a minus sign (in case the number is negative. If you enter PRINT–1;–2;–3 you see only one space between the numbers instead of two.

When you use PRINT by itself, the computer prints and then moves to the beginning of the next line; the result is a printed list of items. Using a semicolon makes the cursor stay where it is, and everything runs together.

If you want something in between the two extremes, you can use a comma to separate the variables. This is helpful when you want columns (rather than just a list). A VIC screen has two columns of eleven characters; a 64 gives you four columns of ten characters. PRINT "A","BC", "DEF","GHIJ","KLMNO","PQRSTUVW" will show you how the columns look (notice that the left edges are lined up). Using commas to make columns can be useful in a variety of applications. For example, FORX=56TO63: PRINTX,PEEK(X): NEXT prints a column of memory addresses followed by their contents.

PRINTing Characters With CHR$

The CHR$ function can be used in place of any string in the PRINT statement. For instance, PRINT CHR$(65) has the same effect as PRINT "A". A list of CHR$ codes can be found in the appendices of the owner's manual or *Programmer's Reference Guide* for your computer.

Some of the CHR$ codes are used for characters. Others are used for functions like "clear screen" or "cyan."

Positioning PRINT

PRINT causes the printing to begin in the first space of the next available unused line on the screen. This beginning position can be controlled, however, by using the equivalent of X and Y coordinates. The Y coordinate specifies the line on which to begin printing, and the X coordinate specifies the space (column) within that line.

Vertical (Y) positioning can be controlled using the LEFT$ function. LEFT$(X$,I) returns a string containing the leftmost I characters of string X$. In positioning printing, we will define a string L$ = "{HOME}{21 DOWN}" for the VIC, or L$ = "{HOME}{23 DOWN} for the 64. To begin on

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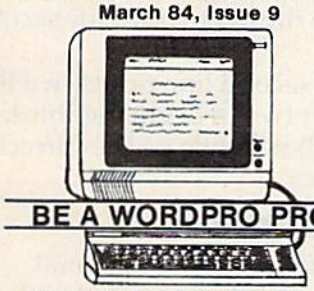

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any line Y, we will use PRINT LEFT$ (L$,Y).

Horizontal (X) positioning can be controlled using the TAB function. PRINT TAB(X) will begin printing in column X of the designated line. Remember that the first position on a line is column 0, the second is column 1, and so on.

Let's combine these two functions and print a red heart in the fifth column of the tenth line on the screen:

```
10 L$ = "{HOME}{21 DOWN}": PRINT "{CLR}"
                                    :rem 104
20 PRINT LEFT$(L$,10) TAB(5) CHR$(28) CHR
   $(115)                           :rem 142
```

Repeating Characters

If a character is to be printed several times, a FOR–NEXT loop is more efficient and takes less memory than repeating the character in the statement:

```
10 L$ = "{HOME}{21 DOWN}": PRINT "{CLR}"
                                    :rem 104
20 PRINT LEFT$(L$,11) TAB(3);       :rem 35
30 PRINT CHR$(30) CHR$(18);         :rem 155
40 FOR I = 1 TO 7: PRINT CHR$(32);: NEXT
                                    :rem 14
```

This program prints a green bar on the eleventh line, beginning in the third column. The CHR$ codes used are:

30 = GREEN
18 = REVERSE ON
32 = SPACE

A Simple Sun

With these four characteristics in mind, let's draw a simple picture using the PRINT statement: a child's representation of the sun.

We need to consider three elements in creating this picture: the individual characters needed, the color desired, and the location of each character. After consulting our chart of CHR$ codes, we find that the needed values are 109, 98, 110, and 113. As for color, let's be conventional and use CHR$(158)—yellow. Coordinates Y=10, X=10 should give us a beginning point roughly at the center of the VIC screen. (You'll need to adjust the TAB values if you want the sun to appear centered on a 64 screen.)

So our sun-drawing program will read:

```
10 L$ = "{HOME}{21 DOWN}": PRINT "{CLR}"
                                    :rem 104
20 PRINT LEFT$(L$,10) TAB(10);      :rem 80
30 PRINT CHR$(158) CHR$(109) CHR$(98) CHR
   $(110)                           :rem 115
40 PRINT TAB(11);                   :rem 182
50 PRINT CHR$(113)                  :rem 217
60 PRINT TAB(10);                   :rem 183
70 PRINT CHR$(110) CHR$(98) CHR$(109)
                                    :rem 135
```

In typing this and other programs, eliminate spaces between words. They add to readability, but use up memory.

Let's draw another picture, this time using a repeated character:

```
10 L$ = "{HOME}{21 DOWN}": PRINT "{CLR}"
                                    :rem 104
20 PRNT LEFT$(L$,10) TAB(7);        :rem 221
30 PRINT CHR$(156) CHR$(18) CHR$(169);: F
   OR I = 1 TO 3: PRINT CHR$(32);: NEXT
                                    :rem 166
40 PRINT CHR$(146) CHR$(169)        :rem 208
50 PRINT TAB(6);                    :rem 139
60 PRINT CHR$(156) CHR$(18) CHR$(169);: F
   OR I = 1 TO 3: PRINT CHR$(32);: NEXT
                                    :rem 169
70 PRINT CHR$(146) CHR$(169)        :rem 211
```

Voilà! A purple parallelogram!

The Basic Picture Elements

We now have all the basic elements necessary to print any picture:

- X, Y positioning of first line
- PRINTing one character
- PRINTing repeated characters
- X positioning of successive lines

Instead of using the TAB function to position all the lines, let's use a string that we'll define as T$ = "{DOWN}{21 LEFT}" for the VIC, or T$ = {DOWN}{39 LEFT} for the 64. By using the LEFT$ function with this string, we can position each new line in relationship to the preceding line. Let's look at our sun-drawing routine again and see how we would program it using T$. In this picture, when the first line is finished printing, the cursor will be in the blank space following the / (slash) character. We want to go down one space and move two spaces to the left to print the second line.

Likewise, after the second line prints, we'll move down one and left two to begin the third line. PRINT LEFT$(T$,3) will give us the correct positioning for both lines.

Writing The Subroutine

At last we are ready to formulate our general PRINT subroutine. This subroutine, used with DATA statements, will print the two pictures we have already created. By adding additional DATA statements, it can also be used to draw any other picture we might design.

```
100 REM***GENERAL PRINT SUB         :rem 104
110 READQ:PRINTLEFT$(L$,Q);         :rem 142
120 READQ:PRINTTAB(Q);              :rem 123
130 READQ:IFQ=0THEN170               :rem 79
140 IFQ<0THENHQ=ABS(Q):READQ:FORI=1TOHQ:P
    RINTCHR$(Q);:NEXT:GOTO130       :rem 62
150 IFQ>191THENPRINTLEFT$(T$,Q/100);:GOTO
    130                             :rem 162
160 PRINTCHR$(Q);:GOTO130            :rem 9
170 RETURN                          :rem 120
900 REM***DATA FOR SUN              :rem 242
```

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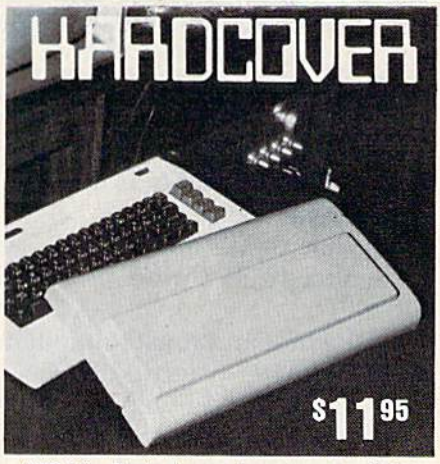

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```
910 DATA5,10,158,109,98,110,300,113,300,1
    10,98,109,0                          :rem 29
920 REM***DATA FOR PARALLELOGRAM         :rem 193
930 DATA10,10,156,18,169,-3,32,146,169,70
    0,156,18,169,-3,32,146,169,0         :rem 117
```

Lines 110 and 120 determine the screen coordinates. Line 130 checks to see if the picture is complete. We will use 0 to indicate the end of a picture since there is no valid CHR$(0). Line 140 handles repeated characters. Our data for a repeated character will be the negative of the number of characters we want to print (we use the negative value to avoid using a valid CHR$ code), followed by the character to be repeated. Line 150 controls tabulation of new lines.

Values desired are multiplied by 100 to take them beyond the range of valid CHR$ codes when creating the DATA. Line 160 prints one character. The whole procedure will continue until all DATA is read and printed and a 0 is encountered.

Add the following lines to complete the program:

```
10 L$="{HOME}{21 DOWN}":T$="{DOWN}
   {21 LEFT}"                            :rem 239
20 PRINT"{CLR}":FORI=1TO2:GOSUB100:NEXT:C
   LR:END                                :rem 99
```

Try running the entire program now, and see our two pictures print.

Adjustments For The 64

When this program is RUN on the 64, the shapes will be drawn off center on the screen. If you find this displeasing, change the definitions for L$ and T$ in line 10 to those mentioned earlier for the 64, then adjust the tabulation values in the DATA statements as appropriate for the 40-column screen.

What are the advantages of using this generalized subroutine rather than a straight PRINT?

The first and most immediate is a savings in memory. After you run this program, enter PRINTFRE(0). You will notice that the memory used is about 422 bytes. Beyond this initial requirement, the memory needed by additional DATA statements will be whatever is required to store the statements themselves. As the number of pictures printed increases, so does the savings in memory.

DATA Used As An Array

This subroutine could also use the DATA statements as if they were an array. An identifier could begin each set of DATA and could be used in the program to find the desired picture.

Here is a very simple program illustrating this use:

```
10 L$="{HOME}{21 DOWN}":T$="{DOWN}
   {21 LEFT}"                            :rem 239
20 PRINT"{CLR}{BLK}{2 SPACES}CHOOSE A SHA
   PE:","{2 DOWN}{PUR} TRIANGLE SQUARE","
   {2 DOWN} RECTANGLE"                   :rem 127
30 PRINT"{2 DOWN} PARALLELOGRAM"         :rem 25
40 INPUTA$:RESTORE                       :rem 183
50 READB$:IFB$="END"THENPRINT"{2 DOWN} NO
   T A VALID CHOICE":FORI=1TO5000:NEXT:GO
   TO20                                  :rem 107
60 IFB$<>A$THEN50                        :rem 206
70 PRINT"{CLR}{3 DOWN}"A$:GOSUB100:FORI=1
   TO4000:NEXT:GOTO20                    :rem 59
100 REM***GENERAL PRINT SUB              :rem 104
110 READQ:PRINTLEFT$(L$,Q);              :rem 142
120 READQ:PRINTTAB(Q);                   :rem 123
130 READQ:IFQ=0THEN170                   :rem 79
140 IFQ<0THENHQ=ABS(Q):READQ:FORI=1TOHQ:P
    RINTCHR$(Q);:NEXT:GOTO130            :rem 62
150 IFQ>191THENPRINTLEFT$(T$,Q/100);:GOTO
    130                                  :rem 162
160 PRINTCHR$(Q);:GOTO130                :rem 9
170 RETURN                               :rem 120
900 DATATRIANGLE,10,10,18,169,127,400,169
    ,-2,32,127,146,0                     :rem 219
910 DATARECTANGLE,10,10,30,18,-5,32,600,-
    5,32,146,0                           :rem 170
920 DATASQUARE,10,10,28,18,-3,32,400,-3,3
    2,400,-3,32,400,-3,32,146,0          :rem 162
930 DATAPARALLELOGRAM,10,10,159,18,169,-3
    ,32,146,169,700,18,169,-3,32,146,169,
    0                                    :rem 159
940 DATAEND                              :rem 142
```

In this example, the DATA is searched and selected as if from an array, but no extra storage space is used. As before, 64 owners may wish to adjust L$, T$, and the tabulation values to reflect their larger screens. You may also want to make the following change to properly align the menu.

```
20 PRINT"{CLR}{BLK}{2 SPACES}CHOOSE A SHA
   PE:":PRINT"{2 DOWN}{PUR} TRIANGLE":PRI
   NT"{2 DOWN}{RIGHT}SQUARE"
30 PRINT"{2 DOWN}{RIGHT}RECTANGLE":PRINT"
   {2 DOWN}{RIGHT}PARALLELOGRAM"
```

Load From Tape Or Disk

The third usage we will consider takes a slightly different approach to our subroutine. Instead of storing DATA as statements in the program, we will create a data file. Our subroutine will then use INPUT# statements instead of READ statements to retrieve the data and accomplish the desired printing.

The wonderful thing about this usage is that the length of the data file is not restricted to the amount of memory in your computer. It can be as large as your tape or disk allows. With this type of processing, you could print picture after picture without ever using any memory beyond the initial amount required to store the program.

An Adaptation For Tape

Here is an adaptation of our previous example program that illustrates the use of a data file as input from tape. Type, SAVE, and RUN the programs in the following order:

1. Type in Program 1 (the main program) and SAVE it on tape.

2. Type in Program 2 (creates the data file) and RUN it, leaving your tape positioned at the end of Program 1. The data file will then immediately follow the main program and can be used as input. Then SAVE Program 2 on tape after the data file, in case you want to create another data file.

3. Rewind tape, LOAD Program 1, and RUN it.

You will notice when you RUN this program that the amount of available memory does not appreciably decrease with each new picture. Only four pictures are included in this particular program, but 400 could have been stored in a data file and used as input without requiring any more memory in the main program.

Program 1:
PRINT Pictures From Data Files

```
10 REM***INPUT DATA FROM TAPE FILE AND DR
   AW SHAPES                          :rem 176
20 L$="{HOME}{21 DOWN}":T$="{DOWN}
   {21 LEFT}"                         :rem 240
30 OPEN1,1,0,"TAPE FILE"              :rem 57
40 INPUT#1,A$:IFA$="END"THENPRINT"{CLR}
   {3 DOWN} THAT'S ALL!":CLOSE1:CLR:END
                                      :rem 215
50 PRINT"{CLR}{3 DOWN}{BLK}"A$        :rem 241
60 GOSUB100                           :rem 119
70 PRINTLEFT$(L$,18)"AVAILABLE MEMORY:"FR
   E(0)                               :rem 207
80 FORI=1TO5000:NEXT:GOTO40           :rem 190
100 REM***GENERAL PRINT SUB USING TAPE IN
    PUT                               :rem 168
110 INPUT#1,Q:PRINTLEFT$(L$,Q)        :rem 71
120 INPUT#1,Q:PRINTTAB(Q)             :rem 52
130 INPUT#1,Q:IFQ=0THEN170            :rem 67
140 IFQ<0THENHQ=ABS(Q):INPUT#1,Q:FORI=1TO
    HQ:PRINTCHR$(Q);:NEXT:GOTO130     :rem 50
150 IFQ>191THENPRINTLEFT$(T$,Q/100);:GOTO
    130                               :rem 162
160 PRINTCHR$(Q);:GOTO130              :rem 9
170 RETURN                            :rem 120
```

Program 2: Data File Creator

```
10 REM***CREATE A TAPE FILE OF DATA
                                      :rem 177
20 OPEN1,1,1,"TAPE FILE"              :rem 57
30 R$=CHR$(13)                        :rem 204
40 READA$:PRINT#1,A$;R$               :rem 66
50 IFA$<>"END"THEN40                  :rem 129
60 CLOSE1:END                         :rem 30
900 DATATRIANGLE,10,10,18,169,127,400,169
    ,-2,32,127,146,0                  :rem 219
910 DATARECTANGLE,10,10,30,18,-5,32,600,-
    5,32,146,0                        :rem 170
920 DATASQUARE,10,10,28,18,-3,32,400,-3,3
    2,400,-3,32,400,-3,32,146,0       :rem 162
930 DATAPARALLELOGRAM,10,10,159,18,169,-3
    ,32,146,169,700,18,169,-3,32,146,169,
    0                                 :rem 159
940 DATAEND                           :rem 142
```


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NEWS & PRODUCTS

Cheatsheet Products' plastic overlay for Easy Script *for the 64.*

VIC And 64 Keyboard Overlays

Cheatsheet Products has produced a series of plastic keyboard overlays for the VIC-20 and Commodore 64 which are quick reference aids for a variety of Commodore and third-party software.

The plastic templates, called *Leroy's Cheatsheets*, include program starting instructions, marked function keys, and reference tables, charts, or drawings.

Overlays are available for the following VIC-20 programs: *Programmer's Aid, Vicmon, Super Expander, VIC Typewriter, and VICTerm I* (all by Commodore), and *Quick Brown Fox* (Quick Brown Fox), *UMI Wordcraft 20* (United Microware Industries, Inc.), *HES Writer* and *HES VIC Forth* (both by Human Engineered Software), as well as *Graphic Printer* (Commodore 1515 and 1525) and a general BASIC overlay.

Overlays for the Commodore 64 programs include: *Term 64* and *Easy Script* (both by Commodore), *HES Writer* and *HESmon* (both by Human Engineered Software), *Quick Brown Fox* (Quick Brown Fox), *WordPro 3/Plus* (Professional Software), *Graphic Printer* (Commodore

1515 and 1525), *Paper Clip* (Batteries Included), and BASIC.

Each overlay sells for $3.95, plus $1 shipping and handling.

Cheatsheet Products
P.O. Box 8299
Pittsburgh, PA 15218
(412) 456-7420

VIC And 64 Cassette Backup

Creative Electronics has produced a cassette backup for the VIC-20 and Commodore 64 which works with any Commodore machine with a data cassette recorder. Written in machine language, the product allows you to protect your programs on tape by creating a reserve copy.

The cassette backup is available for $14.95.

Creative Electronics
P.O. Box 4253
Thousand Oaks, CA 91360
(805) 492-1506

Bible Study For Commodore

Seek-Bible is a group participation program for two to ten people which allows you to competitively search for particular sections of the Bible. It is available on tape for the VIC-20, PET, and Commodore 64 machines.

Using a system of challenges, search periods, solutions, and an internal timer, *Seek-Bible* controls the action of the search. A variety of menus are presented to the searchers from which to choose appropriate actions or supporting displays on the screen or printer.

Seek-Bible sells for $24.95 on tape. Two additional search tapes, *Seek-Bible 2* and *Seek-Bible 3* are available on tape for $12.95 each.

SEI Enterprises, Inc.
17 Serpi Road
Highland Mills, NY 10930
(516) 757-9783

Graphics Package For 64

Doodle!, a graphics program for the Commodore 64 designed to effectively use its color and high resolution capabilities, has been introduced by City Software.

The program works with either a track ball or joystick, and uses color-coded menus and visual cues as aids. Among its features are a "stamp" option which lets you create up to nine repeatable graphic symbols. On-screen designs may be printed on the Commodore 1525 printer and most other popular printers, including C. Itoh 8510 or NEC8023, most Epson or Star/Gemini, and most Okidata printers.

Doodle!'s copy function will duplicate, squeeze, reduce, enlarge, stretch, rotate, or reposition a drawing or part of a drawing on the screen. The save feature will store drawings on a disk for later recall or alterations. You may draw and erase with track ball or joystick in nine pen sizes at nine speeds. With the program, you can draw in 16 colors; choose drawing, fill, and background colors; change any color; or color over anything on the screen.

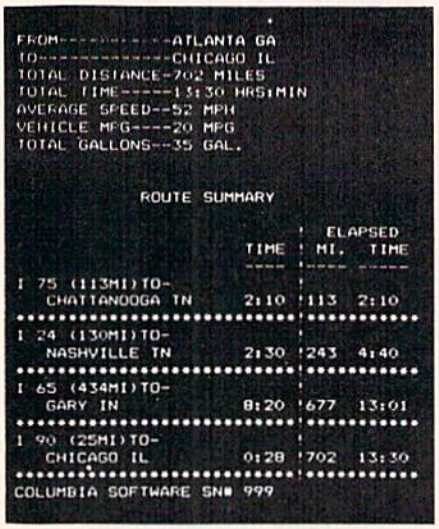
The suggested price for *Doodle!* is $39.95.

City Software Distributors, Inc.
735 West Wisconsin Avenue
Milwaukee, WI 53233
(414) 291-5125

VIC-20 Interface Board

A parallel interface board has been produced by Showtronics for the VIC-20 computer.

The circuit board has two parallel eight-bit ports. One port has buffering and the other can be used for input or output. A 6522 VIA and 2716/32 Eprom are also on the board. Several included routines allow you to use the SYS command for input or output to 2-20 pin connectors. The interface may be used for printer control, cordless telephone input, alarm input-output,



A sample screen from Columbia Software's Roadsearch.

and other applications.

The board sells for $139.00.

Showtronics
6780 Friars Road #105
San Diego, CA 92108
(619) 692-1212

Computerized Road Maps

Roadsearch and *Roadsearch-Plus* have been released by Columbia Software for the Commodore 64.

These computerized road maps simplify the calculation of driving routes, determining the shortest practical routes between cities in its data base.

Roadsearch contains a data base of 406 cities and road intersections and about 70,000 miles of interstate and major highways throughout the U.S. and Canada. *Roadsearch-Plus* offers these features as well as a road map development system that lets you customize maps. With *Roadsearch-Plus*, you can add up to 50 towns and 100 road segments anywhere in North America.

Roadsearch is available on disk for $34.95. *Roadsearch-Plus* sells for $74.95 on disk.

Columbia Software
P.O. Box 2235C
5461 March Hawk
Columbia, MD 21045
(301) 997-3100

64 Color Graphics

Flying Colors, a color graphics package designed for use with a standard joystick, has been released for the Commodore 64 by The Computer Colorworks.

With screen windows, you can pick such functions as thick and thin lines, circles and boxes of any size, erasures, and the ability to fill enclosed areas with a number of colors.

Text can be added to the screen, and a grid feature helps you align your pictures. You may save and retrieve the pictures that are created. *Flying Colors* also includes a program which allows you to produce a slide show with the graphic creations.

Flying Colors is available for $39.95 on disk.

The Computer Colorworks
3030 Bridgeway
Sausalito, CA 94965
(415) 331-3022

64 BASIC Aid

Don's Program House has developed a BASIC programming aid for the Commodore 64 called *BASIC-Plus*, which uses two-touch commands in order to

simplify entry and expand the number of BASIC commands.

Additional commands such as FIND, REF, CRUNCH, UNCRUNCH, DELETE, APPEND, ANALYZE, AUTO, and OLD are included. The two-touch commands (FSET, FLIST, FSAVE, and FLOAD) allow the programmer to define and control up to 64 functions by touching two function keys.

Written in machine language, *BASIC-Plus* is available on disk for $21.95.

Don's Program House
4817 Clipping Court
Louisville, KY 40222
(502) 228-0341

VIC, 64 Modem Adapter

The Universal Modem Adapter by Applied Systems and Products allows a VIC-20 or a Commodore 64 to be used with any type of phone for telecommunications through a VIC modem.

The adapter will support modular as well as non-modular phones, including one-piece electronic phones with built-in dialing. It does not require any modification to your phone or the modem. Nor do you need additional equipment, such as an RS-232 interface or acoustic coupler.

The modem adapter sells for $14.95, plus $2 for shipping.

Applied Systems and Products
1021-H West Bishop
Santa Ana, CA 92703
(714) 541-0233

Games For The 64

Bytes and Bits has released several new games for the Commodore 64.

Dungeons and Demons is a fantasy adventure game in which the player attempts to successfully move a character through 12 levels of a dungeon in search of a golden chalice. With a total of 1200 rooms to explore and more than 40 types of monsters to encounter, the player may choose to be a dwarf, warrior, halfling, thief, elf, or wizard. The game sells for $21.95 on disk and features three-dimensional graphics, multi-color sprite graphics, and sound.

Goombahtz is a computer version of a dice game for up to six players. The game uses six three-dimensional dice and flashes more than 100 messages of encouragement, sympathy, and rule applications as the game progresses. The computer will play against itself, against another player, or allow you to play the game while making sure all rules are followed. *Goombahtz* is available for $16.95 on disk or tape.

Crazy Conveyors is an action game that challenges you to race against time as you climb ladders, slide down fire poles, and cross unpredictable moving conveyors. The player gathers ammo while fending off enemies. A built-in screen creator allows you to expand the game up to 128 screens. Additional disks may be used for unlimited screens. The game uses custom characters, multi-color sprites, three-part harmony music, and works by joystick or keyboard.

Crazy Conveyors sells for $29.95 on disk.

Bytes and Bits
524 East Canterbury Lane
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COMPUTE!'s GAZETTE *welcomes announcements of new products for VIC-20 and Commodore 64 computers, especially products aimed at beginning to intermediate users. Please send press releases and photos well in advance to: Tony Roberts, Assistant Managing Editor,* COMPUTE!'s GAZETTE, *P.O. Box 5406, Greensboro, NC 27403.*

New product releases are selected from submissions for reasons of timeliness, available space, and general interest to our readers. We regret that we are unable to select all new product submissions for publication. Readers should be aware that we present here some edited version of material submitted by vendors and are unable to vouch for its accuracy at time of publication.

A Beginner's Guide To Typing In Programs

What Is A Program?

A computer cannot perform any task by itself. Like a car without gas, a computer has *potential*, but without a program, it isn't going anywhere. Most of the programs published in COMPUTE!'s GAZETTE for Commodore are written in a computer language called BASIC. BASIC is easy to learn and is built into all VIC-20s and Commodore 64s.

BASIC Programs

Each month, COMPUTE!'s GAZETTE for Commodore publishes programs for both the VIC and 64. To start out, type in only programs written for your machine, e.g., "VIC Version" if you have a VIC-20. Later, when you gain experience with your computer's BASIC, you can try typing in and converting certain programs from another computer to yours.

Computers can be picky. Unlike the English language, which is full of ambiguities, BASIC usually has only one "right way" of stating something. Every letter, character, or number is significant. A common mistake is substituting a letter such as O for the numeral 0, a lowercase l for the numeral 1, or an uppercase B for the numeral 8. Also, you must enter all punctuation such as colons and commas just as they appear in the magazine. Spacing can be important. To be safe, type in the listings *exactly* as they appear.

Braces And Special Characters

The exception to this typing rule is when you see the braces, such as "{DOWN}". Anything within a set of braces is a special character or characters that cannot easily be listed on a printer. When you come across such a special statement, refer to "How To Type In *COMPUTE!'s GAZETTE* Programs."

About DATA Statements

Some programs contain a section or sections of DATA statements. These lines provide information needed by the program. Some DATA statements contain actual programs (called machine language); others contain graphics codes. These lines are especially sensitive to errors.

If a single number in any one DATA statement is mistyped, your machine could "lock up," or "crash." The keyboard and STOP key may seem "dead," and the screen may go blank. Don't panic – no damage is done. To regain control, you have to turn off your computer, then turn it back on. This will erase whatever program was in memory, *so always SAVE a copy of your program before you RUN it*. If your computer crashes, you can LOAD the program and look for your mistake.

Sometimes a mistyped DATA statement will cause an error message when the program is RUN. The error message may refer to the program line that READs the data. *The error is still in the DATA statements, though.*

Get To Know Your Machine

You should familiarize yourself with your computer before attempting to type in a program. Learn the statements you use to store and retrieve programs from tape or disk. You'll want to save a copy of your program, so that you won't have to type it in every time you want to use it. Learn to use your machine's editing functions. How do you change a line if you made a mistake? You can always retype the line, but you at least need to know how to backspace. Do you know how to enter inverse video, lowercase, and control characters? It's all explained in your computer's manuals.

A Quick Review

1. Type in the program a line at a time, in order. Press RETURN at the end of each line. Use backspace or the back arrow to correct mistakes.

2. Check the line you've typed against the line in the magazine. You can check the entire program again if you get an error when you RUN the program.

3. Make sure you've entered statements in braces as the appropriate control key (see "How To Type *COMPUTE!'s GAZETTE* Programs" elsewhere in the magazine).

We regret that we are not able to respond to individual inquiries about programs, products, or services appearing in COMPUTE!'s GAZETTE *for Commodore due to increasing publication activity. On those infrequent occasions when a published program contains a typo, the correction will appear in the magazine, usually within eight weeks. If you have specific questions about items or programs which you've seen in* COMPUTE!'s GAZETTE *for Commodore, please send them to Gazette Feedback, P.O. Box 5406, Greensboro, NC 27403.*

How To Type In COMPUTE!'s GAZETTE Programs

Many of the programs which are listed in COMPUTE!'s GAZETTE contain special control characters (cursor control, color keys, inverse video, etc.). To make it easy to know exactly what to type when entering one of these programs into your computer, we have established the following listing conventions.

Generally, any VIC-20 or Commodore 64 program listings will contain words within braces which spell out any special characters: {DOWN} would mean to press the cursor down key. {5 SPACES} would mean to press the space bar five times.

To indicate that a key should be *shifted* (hold down the SHIFT key while pressing the other key), the key would be underlined in our listings. For example, S would mean to type the S key while holding the shift key. This would appear on your screen as a "heart" symbol. If you find an underlined key enclosed in braces (e.g., {10 N}), you should type the key as many times as indicated (in our example, you would enter ten shifted N's).

If a key is enclosed in special brackets, [k], you should hold down the *Commodore key* while pressing the key inside the special brackets. (The Commodore key is the key in the lower left corner of the keyboard.) Again, if the key is preceded by a number, you should press the key as many times as necessary.

Rarely, you'll see a solitary letter of the alphabet enclosed in braces. These characters can be entered on the Commodore 64 by holding down the CTRL key while typing the letter in the braces. For example, {A} would indicate that you should press CTRL-A. You should never have to enter such a character on the VIC-20, but if you do, you would have to leave the quote mode (press RETURN and cursor back up to the position where the control character should go), press CTRL-9 (RVS ON), the letter in braces, and then CTRL-0 (RVS OFF).

About the *quote mode*: You know that you can move the cursor around the screen with the CRSR keys. Sometimes a programmer will want to move the cursor under program control. That's why you see all the {LEFT}'s, {HOME}'s, and {BLU}'s in our programs. The only way the computer can tell the difference between direct and programmed cursor control is the quote mode.

Once you press the quote (the double quote, SHIFT-2), you are in the quote mode. If you type something and then try to change it by moving the cursor left, you'll only get a bunch of reverse-video lines. These are the symbols for cursor left. The only editing key that isn't programmable is the DEL key; you can still use DEL to back up and edit the line. Once you type another quote, you are out of quote mode.

You also go into quote mode when you INSerT spaces into a line. In any case, the easiest way to get out of quote mode is to just press RETURN. You'll then be out of quote mode and you can cursor up to the mistyped line and fix it.

Use the following table when entering cursor and color control keys:

When You Read:	Press:	See:	When You Read:	Press:	See:	When You Read:	Press:	See:
{CLR}	SHIFT + CLR/HOME		{CYN}	CTRL + 4		[7]	C= + 7	
{HOME}	CLR/HOME		{PUR}	CTRL + 5		[8]	C= + 8	
{UP}	SHIFT + CRSR ↑		{GRN}	CTRL + 6		{F1}	f1	
{DOWN}	CRSR ↑		{BLU}	CTRL + 7		{F2}	SHIFT + f1	
{LEFT}	SHIFT + CRSR →		{YEL}	CTRL + 8		{F3}	f3	
{RIGHT}	CRSR →		[1]	C= + 1		{F4}	SHIFT + f3	
{RVS}	CTRL + 9		[2]	C= + 2		{F5}	f5	
{OFF}	CTRL + 0		[3]	C= + 3		{F6}	SHIFT + f5	
{BLK}	CTRL + 1		[4]	C= + 4		{F7}	f7	
{WHT}	CTRL + 2		[5]	C= + 5		{F8}	SHIFT + f7	
{RED}	CTRL + 3		[6]	C= + 6				

The Automatic Proofreader

"The Automatic Proofreader" will help you type in program listings from COMPUTE!'s Gazette without typing mistakes. It is a short error-checking program that hides itself in memory. When activated, it lets you know immediately after typing a line from a program listing if you have made a mistake. Please read these instructions carefully before typing any programs in COMPUTE!'s Gazette.

Preparing The Proofreader

1. Using the listing below, type in the Proofreader. The same program works on both the VIC-20 and Commodore 64. Be very careful when entering the DATA statements — don't type an l instead of a 1, an O instead of a 0, extra commas, etc.

2. SAVE the Proofreader on tape or disk at least twice *before running it for the first time*. This is very important because the Proofreader erases this part of itself when you first type RUN.

3. After the Proofreader is SAVEd, type RUN. It will check itself for typing errors in the DATA statements and warn you if there's a mistake. Correct any errors and SAVE the corrected version. Keep a copy in a safe place — you'll need it again and again, every time you enter a program from COMPUTE!'s Gazette.

4. When a correct version of the Proofreader is RUN, it activates itself. You are now ready to enter a program listing. If you press RUN/STOP-RESTORE, the Proofreader is disabled. To reactivate it, just type the command SYS 886 and press RETURN.

Using The Proofreader

All VIC and 64 listings in COMPUTE!'s Gazette now have a *checksum number* appended to the end of each line, for example ":rem 123". *Don't enter this statement when typing in a program.* It is just for your information. The rem makes the number harmless if someone does type it in. It will, however, use up memory if you enter it, and it will confuse the Proofreader, even if you entered the rest of the line correctly.

When you type in a line from a program listing and press RETURN, the Proofreader displays a number at the top of your screen. *This checksum number must match the checksum number in the printed listing.* If it doesn't, it means you typed the line differently than the way it is listed. Immediately recheck your typing. Remember, don't type the rem statement with the checksum number; it is published only so you can check it against the number which appears on your screen.

The Proofreader is not picky with spaces. It will not notice extra spaces or missing ones. This is for your convenience, since spacing is generally not important. But occasionally proper spacing *is* important, so be extra careful with spaces, since the Proofreader will catch practically everything else that can go wrong.

There's another thing to watch out for: if you enter the line by using abbreviations for commands, the checksum will not match up. But there is a way to make the Proofreader check it. After entering the line, LIST it. This eliminates the abbreviations. Then move the cursor up to the line and press RETURN. It should now match the checksum. You can check whole groups of lines this way.

Special Tape SAVE Instructions

When you're done typing a listing, you must disable the Proofreader before SAVEing the program on tape. Disable the Proofreader by pressing RUN/STOP-RESTORE (hold down the RUN/STOP key and sharply hit the RESTORE key). This procedure is not necessary for disk SAVEs, *but you must disable the Proofreader this way before a tape SAVE.*

SAVE to tape erases the Proofreader from memory, so you'll have to LOAD and RUN it again if you want to type another listing. SAVE to disk does not erase the Proofreader.

Replace Original Proofreader

If you typed in the original version of the Proofreader (October 1983 issue), you should replace it with the improved version below. We added a POKE to the original version to protect it from being erased when you LOAD another program from tape. The POKE does protect the Proofreader, and the Proofreader itself was not affected. However, a quirk in the VIC-20's operating system means that programs typed in with the Proofreader and SAVEd on tape cannot be LOADed properly later. If you LOAD a program SAVEd while the Proofreader was in memory, you see ?LOAD ERROR. This applies only to VIC tape SAVEs (disk SAVEs work OK, and the quirk was fixed in the Commodore 64).

If you have a program typed in with the original Proofreader and SAVEd on tape, follow this special LOAD procedure:

1. Turn the power off, then on.

2. LOAD the program from tape (disregard the ?LOAD ERROR).

3. Enter: POKE 45,PEEK(174):POKE 46,PEEK(175):CLR

4. ReSAVE the program to tape.

The program will LOAD fine in the future. We strongly recommend that you type in the new version of the Proofreader and discard the old one.

Automatic Proofreader For VIC And 64

```
100 PRINT"{CLR}PLEASE WAIT...":FORI=886TO
    1018:READA:CK=CK+A:POKEI,A:NEXT
110 IF CK<>17539 THEN PRINT"{DOWN}YOU MAD
    E AN ERROR":PRINT"IN DATA STATEMENTS.
    ":END
120 SYS886:PRINT"{CLR}{2 DOWN}PROOFREADER
     ACTIVATED.":NEW
886 DATA 173,036,003,201,150,208
892 DATA 001,096,141,151,003,173
898 DATA 037,003,141,152,003,169
904 DATA 150,141,036,003,169,003
910 DATA 141,037,003,169,000,133
916 DATA 254,096,032,087,241,133
922 DATA 251,134,252,132,253,008
928 DATA 201,013,240,017,201,032
934 DATA 240,005,024,101,254,133
940 DATA 254,165,251,166,252,164
946 DATA 253,040,096,169,013,032
952 DATA 210,255,165,214,141,251
958 DATA 003,206,251,003,169,000
964 DATA 133,216,169,019,032,210
970 DATA 255,169,018,032,210,255
976 DATA 169,058,032,210,255,166
982 DATA 254,169,000,133,254,172
988 DATA 151,003,192,087,208,006
994 DATA 032,205,189,076,235,003
1000 DATA 032,205,221,169,032,032
1006 DATA 210,255,032,210,255,173
1012 DATA 251,003,133,214,076,173
1018 DATA 003
```

Castle Dungeon

See article on page 52.

BEFORE TYPING...

Before typing in programs, please refer to "How To Type COMPUTE!'s Gazette Programs," "A Beginner's Guide To Typing In Programs," and "The Automatic Proofreader" that appear before the Program Listings.

Program 1:

Castle Dungeon—VIC Version, Loader

```
1 PRINTCHR$(147):POKE52,29:POKE56,29:CLR
                                    :rem 153
2 SV=36873:S1=SV+1:S2=SV+2:S3=SV+3:V=SV+5
  :SB=SV+6                          :rem 21
3 READL,N:IFN=-1THEN5               :rem 43
4 FORJ=0TON:READS:POKEL+J,S:NEXT:GOTO3
                                    :rem 52
5 POKESB,110:FORT=1TO500:NEXT       :rem 75
6 FORM=1TO3:READA,B,C,D,E           :rem 3
7 POKES1,A:POKES2,B:POKES3,C:FORJ=15TOEST
  EP-1:POKEV,J:FORT=1TOD:NEXT:NEXT:NEXT
                                    :rem 11
10 FORT=1TO2000:NEXT                :rem 232
11 PRINTCHR$(147):FORT=1TO500:NEXT
                                    :rem 113
12 POKESB,59:POKESV-4,242           :rem 248
13 FORT=1TO500:NEXT                 :rem 190
14 PRINTCHR$(144)"{UP}{RIGHT}FIND AND DEF
  USE THE"                          :rem 224
15 PRINT:PRINT" BOMBS HIDDEN IN THE"
                                    :rem 149
16 PRINT:PRINT" DUNGEON. DON'T FALL"
                                    :rem 56
17 PRINT:PRINT" INTO A PIT OR GET"
                                    :rem 233
18 PRINT"{DOWN}{RIGHT}EATEN BY A BEAST."
                                    :rem 78
19 PRINT"{DOWN}{RIGHT}PRESS THE 'L' KEY F
  OR"                               :rem 65
20 PRINT"{RIGHT}A LEVITATION SPELL."
                                    :rem 62
21 PRINT:PRINT"{RIGHT}YOU HAVE 5 MINUTES"
                                    :rem 19
22 PRINT"{DOWN}{RIGHT}TO COMPLETE YOUR":P
  RINT"{DOWN}{RIGHT}QUEST."         :rem 167
23 POKE143,VAL(MID$(TI$,5,2))       :rem 91
24 READCL:IFCL=-1THEN26             :rem 155
25 FORJ=CLTOCL+7:READCC:POKEJ,CC:NEXT:GOT
  O24                               :rem 139
26 PRINT:PRINT"(HIT ANY KEY TO BEGIN)"
                                    :rem 143
27 GETA$:IFA$=""THEN27              :rem 245
28 PRINT"{CLR}":FORJ=1TO3:POKESV+J,0:NEXT
  :S$="LO"+CHR$(34)+"D"+CHR$(34)+",8:"+C
  HR$(131)                          :rem 192
29 FOR I=1TOLEN(S$):POKE630+I,ASC(MID$(S$
  ,I)):NEXT:POKE198,I:END           :rem 98
30 DATA7878,20,114,64,73,73,32,110,85,73,
  110,85,64,73,112,64,75,85,64,73,85,73,
  110                               :rem 14
31 DATA7900,20,93,32,93,93,32,93,93,93,93
  ,93,64,73,107,64,32,93,32,93,93,93,93
                                    :rem 94
32 DATA7922,20,113,64,75,74,64,115,125,74
  ,75,74,64,75,109,64,73,74,64,75,125,74
  ,75                               :rem 34
33 DATA7792,17,85,64,73,112,64,110,85,64,
  75,64,114,64,112,32,32,112,64,75
                                    :rem 75
34 DATA7814,16,93,32,32,107,64,115,74,64,
  73,32,93,32,93,32,32,107,64       :rem 80
35 DATA7836,17,74,64,75,75,32,125,85,64,7
  5,32,75,32,74,64,75,109,64,73     :rem 216
40 DATA -1,-1                       :rem 102
41 DATA0,0,219,36,5,0,236,231,36,5,237,23
  1,226,100,0                       :rem 13
44 DATA7632,247,227,246,193,215,247,235,2
  35,7640,255,34,34,34,255,68,68,68
                                    :rem 162
45 DATA7648,255,231,195,129,129,131,199,2
  55,7656,255,191,95,64,90,186,255,255
                                    :rem 76
46 DATA7664,191,121,112,1,0,135,55,115,76
  72,255,239,247,231,195,195,231,255
                                    :rem 184
47 DATA7424,255,255,255,255,255,255,255,2
  55,7440,255,255,255,129,129,255,255,25
  5,7432                            :rem 205
48 DATA255,255,255,255,255,255,255,255,74
  48,255,253,251,247,143,207,175,255
                                    :rem 210
49 DATA7456,191,121,112,1,0,135,55,115,74
  64,255,255,231,0,0,231,255,255,-1
                                    :rem 98
```

Program 2:

Castle Dungeon—VIC Version, Main Program

```
1 PRINTCHR$(147);CHR$(144):S1=36874:S2=S1
  +1:S3=S1+2:S4=S1+3:V=S1+4:SB=S1+5:CL=S1
  -5                                :rem 255
2 C=30720:L=7680:MW=59:FC=0:PC=33:BT=8182
  :FV=15:FP=0:CS=0:POKESB,8:R=37154:AF=0:
  KF=0                              :rem 215
3 POKEV,15:POKECL,255:FORJ=LTOL+505:POKEJ
  +C,0:POKEJ,32:NEXT                :rem 236
4 READD:IFD=-1THEN6                 :rem 161
5 POKEL+D,MW:L=L+D:GOTO4            :rem 20
6 L=7680:FORJ=1TO9:READD:POKEL+D,34:NEXT
                                    :rem 19
7 FORJ=1TO46:READD:POKEL+D,33:NEXT
                                    :rem 172
8 FORJ=1TO3:GOSUB67:POKEB+L,63:NEXT:rem 4
9 FORJ=1TO9:GOSUB67:POKEB+L,36:NEXT
                                    :rem 11
10 PC=32:GOSUB67:POKEB+L,61         :rem 114
11 GOSUB67:POKEB+L,35               :rem 5
12 FORJ=1TO3:GOSUB67:POKEB+L,60:NEXT
                                    :rem 44
13 GOSUB67:M=B+L:TI$="000000"       :rem 106
14 POKER,127:JS=(PEEK(37137)AND28)OR(PEEK
  (37152)AND128):JS=ABS(JS-100)/4-7:POKE
  R,255                             :rem 129
15 IFTI$>"000500"THEN48             :rem 248
16 IFJS=6THENDR=-22                 :rem 153
17 IFJS=5THENDR=22                  :rem 108
18 IFJS=3THENDR=-1                  :rem 101
19 IFJS=11THENDR=1                  :rem 104
20 IFJS=7THENDR=0                   :rem 52
21 P=PEEK(DR+M):IFP=59THENDR=0      :rem 106
22 IFP=35THENCS=1:POKEBT,35:POKEBT+C,5:BT
  =BT+1                             :rem 123
23 IFP=36THEN78                     :rem 136
```

```
24 IFP=34ANDKF=ØTHENGOSUB73          :rem 211
25 IFP=61THENKF=1:POKE8181,61:POKE8181+C,
   5                                 :rem 240
26 GETL$:IFL$="L"THENLS=1:GOSUB82    :rem 30
27 IFP=6ØANDLS<>1THENFP=1            :rem 59
28 IFP=6ØANDLS=1THENFP=2:PIT=M+DR:rem 114
29 IFP=63THENAF=AF+1:POKEBT,63:POKEBT+C,5
   :BT=BT+1:GOSUB75                  :rem 77
3Ø IFDR=ØANDFC=1THEN44               :rem 86
31 POKEM,32:POKEM+C,7:POKEM+DR+C,7:POKEM+
   DR,58                             :rem 8Ø
32 POKEM+DR+C-22,7:POKEM+DR+C+22,7:POKEM+
   DR+C+1,7:POKEM+DR+C-1,7           :rem 37
33 POKEM+DR+C-23,7:POKEM+DR+C+23,7:POKEM+
   DR+C+21,7:POKEM+DR+C-21,7:FC=1:rem 189
34 IFP=35ORP=61THENGOSUB7Ø           :rem 15Ø
35 IFFP=1THENPOKEM+DR,6Ø:GOTO76      :rem 217
36 IFPS=1THENPOKEPIT,6Ø:PS=Ø         :rem 48
37 IFFP=2THENPS=1:FP=Ø               :rem 123
38 LS=Ø:IFDR=ØTHEN44                 :rem 218
39 POKES3,24Ø:FORT=1TO2:NEXT:POKES3,Ø
                                     :rem 95
4Ø IFDR=-22THENPOKEM+C+23,Ø:POKEM+C+22,Ø:
   POKEM+C+21,Ø:GOTO44               :rem 84
41 IFDR=1THENPOKEM+C-23,Ø:POKEM+C-1,Ø:POK
   EM+C+21,Ø:GOTO44                  :rem 198
42 IFDR=-1THENPOKEM+C-21,Ø:POKEM+C+1,Ø:PO
   KEM+C+23,Ø:GOTO44                 :rem 242
43 POKEM+C-23,Ø:POKEM+C-22,Ø:POKEM+C-21,Ø
                                     :rem 96
44 M=M+DR:FC=1:IFAF=3THEN46          :rem 138
45 GOTO14                            :rem 7
46 POKESB,27:FORT=1TO3ØØØ:NEXT:POKECL,24Ø
   :PRINTCHR$(147):PRINT" YOU SAVED THE C
   ASTLE"                            :rem 12
47 PRINT:PRINT:PRINT" PLAY AGAIN?":GOTO52
                                     :rem 121
48 POKES4,22Ø:FORJ=15TOØSTEP-.5:POKESB,12
   7:POKEV,J:FORT=1TO1Ø:NEXT         :rem 232
49 POKESB,42:FORT=1TO1Ø:NEXT:NEXT:POKES4,
   Ø                                 :rem 232
5Ø FORT=1TO5ØØØ:NEXT                 :rem 239
51 POKECL,24Ø:PRINTCHR$(147):PRINT"PLAY A
   GAIN? Y/N"                        :rem 81
52 GETA$:IFA$=""THEN52               :rem 241
53 IFA$="Y"THENRESTORE:GOTO1         :rem 45
54 IFA$<>"N"THEN52                   :rem 255
55 END                               :rem 65
56 DATAØ,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,
   1,1,1,1,1,1,3,4,6,8,1,3,4,2,1,1,2,2,1,
   1,1,1,2                           :rem 25Ø
57 DATA1,2,1,1,1,2,2,4,2,4,2,1,2,5,2,2,1,
   1,2,1,3,2,1,2,3,2,2,3,4,2,1,2,1,5,2,2,
   1,2,4,5                           :rem 18
58 DATA1,1,1,1,1,1,2,3,2,1,1,1,1,2,1,1,1,
   1,7,3,6,2,3,1,2,1,1,2,1,1,1,1,2,1,1,1,
   1,2,3,1                           :rem 254
59 DATA2,6,2,2,4,2,1,2,1,2,3,3,4,2,7,1,2,
   1,1,1,1,1,1,1,1,1,4,1,2,1,1,2,1,12,2,3,2
   ,2,1,1,1                          :rem 61
6Ø DATA2,1,2,2,1,2,2,3,2,2,1,2,2,3,3,2,1,
   1,1,1,1,2,2,1,2,2,1,1,1,3,3,4,2,2,1,4,
   3,1,1,1                           :rem 254
61 DATA1,2,2,1,1,4,1,2,2,9,6,2,1,2,1,1,1,
   1,1,1,1,1,1,1,2,1,1,2,1,1,1,1,1,4,2,5,2,
   8,1,6                             :rem 173
62 DATA3,4,3,1,1,1,1,1,1,1,1,1,1,1,1,1,1,
   1,1,1,1,1,1,1,1,1,-1              :rem 252
63 DATA67,72,1Ø2,127,14Ø,24Ø,28Ø,316,419
                                     :rem 227
64 DATA23,24,26,27,28,45,46,48,49,5Ø,82,8
   3,84,1Ø5,1Ø6,123,124,125,145,146,147,1
   62,163                            :rem 154
65 DATA184,185,195,196,217,218,3Ø1,3Ø2,32
   3,324,338,339,36Ø,361,441,442,443,445
                                     :rem 85
66 DATA463,464,465,466,467           :rem 81
67 B=INT(RND(1)*5Ø1)+Ø               :rem 169
68 IFPEEK(B+L)<>PCTHEN67             :rem 213
69 RETURN                            :rem 79
7Ø POKES3,185:POKES2,2Ø2:POKES1,2Ø2:FORJ=
   15TOØSTEP-.5:POKEV,J:NEXT:POKES3,21Ø
                                     :rem 74
71 POKES1,232:POKES2,232:FORJ=15TOØSTEP-.
   Ø5:POKEV,J:NEXT                   :rem 26
72 FORJ=ØTO2:POKES1+J,Ø:NEXT:POKEV,15:RET
   URN                               :rem 126
73 POKEM,32:POKEM+DR,37:POKES4,13Ø:FORJ=1
   5TOØSTEP-1:POKEV,J:NEXT:POKES4,Ø:POKEM
   +DR,34                            :rem 179
74 POKEM,58:POKEV,15:DR=Ø:FORT=1TO5ØØ:NEX
   T:RETURN                          :rem 188
75 POKES3,22Ø:FORT=1TO5Ø:NEXT:POKES3,Ø:RE
   TURN                              :rem 17Ø
76 FORJ=254TO18ØSTEP-.5:POKES2,J:POKES3,J
   :POKEV,FV:FV=FV-.1:NEXT:POKES2,Ø:POKES
   3,Ø                               :rem 23
77 POKECL,24Ø:PRINTCHR$(147):PRINT" YOU F
   ELL INTO A PIT":GOTO81            :rem 18
78 FORG=19ØTO235:POKES4,G:FORT=1TO1Ø:NEXT
   :NEXT:FORG=235TO22ØSTEP-1:POKES4,G:FOR
   T=1TO2Ø                           :rem 72
79 NEXT:NEXT:FORJ=15TO5STEP-.1:POKEV,J:NE
   XT:POKES4,Ø:POKEV,15:IFCS=1THEN24
                                     :rem 131
8Ø POKECL,24Ø:PRINTCHR$(147):PRINT" YOU L
   OST TO A BEAST!!"                 :rem 124
81 POKESB,27:FORT=1TO3ØØØ:NEXT:GOTO51
                                     :rem 93
82 FORI=ØTO3:FORJ=ØTO15:POKEV,J:N=18Ø+I*J
   :POKES3,N:NEXTJ,I:POKES3,Ø:RETURN
                                     :rem 63
```

Program 3:

Castle Dungeon—64 Version

```
Ø GOSUB 5ØØØ:GOSUB15ØØ:GOSUB2ØØ:GOSUB1ØØØ
  :GOSUB11ØØ:GOSUB13ØØ::GOSUB1Ø1Ø:rem 1Ø8
1 GOSUB 114Ø                         :rem 119
5 GOSUB 3ØØØ:GOSUB 4ØØØ:GOSUB 15ØØ:TI$="Ø
  ØØØØØ"                             :rem 18
7 GOSUB 2Ø:GOTO 7                    :rem 195
1Ø JOY=Ø:JY=PEEK(56321Ø):J2=15-(JYAND15):O
   NJ2 GOTO11,12,12,13,13,13,13,14:RETURN
                                     :rem 25Ø
11 JOY=-4Ø:RETURN                    :rem 6Ø
12 JOY=4Ø:RETURN                     :rem 16
13 JOY=-1:RETURN                     :rem 11
14 JOY=1:RETURN                      :rem 223
2Ø GOSUB 1Ø                          :rem 67
25 GET A$:IFA$="L" THEN GOSUB 491:LEVITAT
   E=-1                              :rem 39
27 IF TI$>"ØØØ3ØØ"THEN A$="YOUR TIME RAN
   {SPACE}OUT":GOTO 6ØØ              :rem 211
3Ø TEMP=PEEK(MAN+JOY)-4Ø:IFTEMP<ØTHENLEVI
   TATE=Ø:GOTO17Ø                    :rem 7Ø
4Ø ON TEMP GOSUB 5Ø,6Ø,8Ø,9Ø,11Ø,13Ø,14Ø,
   15Ø,16Ø:GOTO 17Ø                  :rem 166
5Ø GOSUB 22Ø:JOY=Ø:RETURN            :rem 44
6Ø IFNOTLEVITATETHENPOKEMAN,BLANK:GOSUB12
   5:A$="YOU FELL INTO A PIT":GOTO1Ø5
                                     :rem 21
```

```
70 K=1:RETURN                                :rem 58
80 KEY=-1:POKE1303,43:POKE55575,1:GOSUB 4
   01:RETURN                                 :rem 233
90 GOSUB 320:IF NOT SWRD THEN A$="YOU LOS
   T TO A BEAST":GOTO 600                    :rem 40
100 GOSUB 360:RETURN                         :rem 196
105 GOSUB 220:FORTD=1TO200:NEXT:GOTO 600
                                             :rem 136
110 BOMB=BOMB-1:POKE 1823+40*BOMB,45:POKE
    56095+40*BOMB,1:IF BOMB=0 THEN 500
                                             :rem 212
120 RETURN                                   :rem 115
125 GOSUB260:GOSUB220:FORTD=1TO200:RETURN
                                             :rem 116
130 RETURN                                   :rem 116
140 IF NOT KEY THEN GOSUB 220:JOY=0:RETUR
    N                                        :rem 244
150 RETURN                                   :rem 118
160 SWRD=-1:GOSUB 401:POKE 1423,49:POKE55
    695,1:RETURN                             :rem 123
170 XH=0:POKE MAN,BLANK:MAN=MAN+JOY:POKE
    {SPACE}MAN,FIGURE:IF K=1 THEN POKE MA
    N,42:K=1                                 :rem 62
180 Q=MAN-1024:Y=INT(Q/40):X=(Q-Y*40)*8:I
    FX>255THENXH=INT(X/256):X=X-XH*256
                                             :rem 240
190 Y=Y*8+32:POKE HXSPRITE,XH:POKE LXSPRI
    TE,X:POKE YSPRITE,Y:BLANK=32             :rem 241
195 IFK=1THENK=0:BLANK=42                    :rem 19
196 RETURN                                   :rem 128
200 FOR I=1TO4:READ NO(1,I),DUR(1,I):NEXT
                                             :rem 120
201 FOR I=1TO7:READ NO(2,I),NL(2,I),DUR(2
    ,I):NEXT                                 :rem 60
205 RETURN                                   :rem 119
210 DATA 8,100,7,50,7,50,12,300,14
                                             :rem 105
211 DATA 2,24,100,2,24,100,2,24,100,2,163
    ,100,2,24,100,2,163,100,3,35             :rem 235
220 REM BUMP SOUND                           :rem 53
230 POKE H1,15:POKE L1,10                    :rem 66
240 POKE VOLUME,15:POKE ATTDEC,20:POKE SU
    STREL,5:POKE WAVE,NOISE                  :rem 29
250 FOR TD=1TO10:NEXT:POKE WAVE,NOISE-1:F
    OR TD=1TO2:NEXT:RETURN                   :rem 52
260 REM FALLING SOUND                        :rem 2
270 POKE ATTDEC,10:POKE SUSTREL,10:POKE V
    OLUME ,15                                :rem 5
280 FOR I=200 TO 100 STEP-1                  :rem 103
290 POKE H1,I:POKE H2,100:POKE WAVE,TRIAN
    GLE                                      :rem 118
300 FOR TD=1TO3:NEXT:POKE WAVE,TRIANGLE-1
    :FOR TD=1TO3:NEXT:NEXT I                 :rem 131
310 RETURN                                   :rem 116
320 REM LION SOUND                           :rem 52
330 POKE ATTDEC,100:POKE SUSTREL,100:POKE
     VOLUME,15                               :rem 98
340 POKE H1,2 :POKE H2,10:POKE WAVE,NOISE
    :FORTD=1TO1000:NEXT:POKE WAVE,NOISE-1
                                             :rem 251
350 FORTD=1TO100:NEXT:RETURN                 :rem 76
360 REM VICTORY SOUND                        :rem 54
370 POKE ATTDEC,100:POKE SUSTREL,100:POKE
     VOLUME,15                               :rem 102
380 FORI= 1 TO 4:POKE H1,NO(1,I):POKE H2,
    100:POKE WAVE,SAW                        :rem 5
390 FOR TD=1 TO DUR(1,I):NEXT:POKE WAVE,S
    AW-1:FOR TD=1 TO DUR(1,I):NEXT:NEXT
                                             :rem 54
400 RETURN                                   :rem 116
401 POKE ATTDEC,14:POKE SUSTREL,201
                                             :rem 100
402 POKE H1,120:POKE WAVE,SAW:FORTD=1TO10
    0:NEXT:POKEWAVE,SAW-1                    :rem 149
403 FOR TD=1TO200:NEXT:RETURN                :rem 76
410 REM WIN SOUND AND OPENING SOUND
                                             :rem 92
420 POKEVOLUME,15:POKE ATTDEC,17:POKE SUS
    TREL,140                                 :rem 61
430 FOR I= 1TO7:POKE H2,NO(2,I):POKE H1,N
    L(2,I):POKE WAVE ,SAW                    :rem 6
440 FOR TD=1TODUR(2,I):NEXT:POKEWAVE,SAW-
    1:FORTD=1TODUR(2,I):NEXT:NEXT:RETURN
                                             :rem 78
450 REM LOSE SOUND                           :rem 57
460 POKE ATTDEC,100:POKE SUSTREL,120:POKE
     VOLUME,15                               :rem 104
470 POKE H1,4:POKE L1,48:POKE WAVE,SAW:FO
    RTD=1TO500:NEXT:POKE WAVE,SAW-1
                                             :rem 189
480 FOR TD=1TO400:NEXT:POKE H1,2:POKEL1,2
    4:POKEWAVE,SAW:FORTD=1TO900:NEXT
                                             :rem 128
485 POKEWAVE,SAW-1:FOR TD=1TO500:NEXT:RET
    URN                                      :rem 106
490 REM LEVITATE SOUND                       :rem 104
491 POKE ATTDEC,100:POKE SUSTREL,250:POKE
     VOLUME,15                               :rem 112
492 FOR A=10TO20:FOR B=20 TO27:POKE H1,A+
    B:POKE L1,40:POKE WAVE,TRIANGLE
                                             :rem 200
493 FOR TD=1 TO2 :NEXT:POKE WAVE,TRIANGLE
    -1:FOR TD=1 TO 1:NEXT:NEXT:NEXT
                                             :rem 189
494 RETURN                                   :rem 129
500 POKE53269,0:GOSUB 410:POKE BACKGROUND
    ,1:FOR TD=1 TO 2000:NEXT                 :rem 35
510 PRINT"{CLR}":POKE 251,50:PRINT"{BLK}
    {7 DOWN}{11 RIGHT}CONGRATULATIONS !"
                                             :rem 123
520 PRINT"{2 DOWN}{9 RIGHT}YOU SAVED THE
    {SPACE}CASTLE"                           :rem 156
530 GOTO 700                                 :rem 104
600 POKE 53269,0:POKE BACKGROUND,1:GOSUB
    {SPACE}450:FOR TD=1 TO 2000:NEXT
                                             :rem 40
610 PRINT"{CLR}{8 DOWN}{BLK}"SPC(((40-(LE
    N(A$)))/2))A$                            :rem 41
620 PRINT"{3 DOWN}{10 RIGHT}YOU LOST THE
    {SPACE}CASTLE!"                          :rem 187
630 GOTO 710                                 :rem 106
700 POKE251,0:FORTD=1TO1500:NEXT:PRINT"
    {2 DOWN}{14 RIGHT}THIS TIME" :rem 237
710 FORTD=1TO500:NEXT:PRINT"{5 DOWN}
    {6 SPACES}HIT Y FOR FURTHER ADVENTURE
    S"                                       :rem 220
720 GET ANS$:IFANS$=""THEN720                :rem 151
730 IF ANS$="Y"THEN POKE BACKGROUND,0:GOT
    O 5                                      :rem 75
740 POKE251,0:END                            :rem 207
1000 FORL=679TO703:READA:POKEL,A:NEXT:POK
     E806,167:POKE807,2:POKE251,40:RETURN
                                             :rem 40
1010 PRINTCHR$(144)"{CLR}{5 DOWN}{WHT}
     {2 SPACES}FIND THE BOMBS HIDDEN IN T
     HE DUNGEON."                            :rem 66
1020 PRINT"{DOWN}{2 RIGHT}DON'T FALL INTO
      A PIT OR GET EATEN BY "                :rem 75
1030 PRINT"{2 RIGHT}A BEAST. PRESS THE 'L
       KEY FOR A "                           :rem 198
```

```
1040 PRINT"{DOWN}{2 SPACES}LEVITATION SPE
     LL. YOU HAVE 3 MINUTES"      :rem 205
1050 PRINT"{DOWN}{2 SPACES}TO FULFILL YOU
     R QUEST."                    :rem 104
1060 PRINT:PRINT:PRINT"{9 SPACES}(HIT BUT
     TON TO BEGIN)"               :rem 64
1065 GOSUB 10:IF JY<>111 THEN 1065:rem 33
1067 RETURN                       :rem 174
1070 DATA72,138,72,152,72,166,251,240,8,1
     60,255,136,208,253,202       :rem 81
1080 DATA 208,248,104,168,104,170,104,76,
     202,241                      :rem 53
1100 CM=14336:CS=53248:POKE56334,PEEK(563
     34)AND254:POKE1,PEEK(1)AND251
                                  :rem 254
1110 FORI=0TO1023:POKECM+I,PEEK(CS+I):NEX
     T                            :rem 91
1120 FORI=CM+320TOCM+320+95:READA:POKEI,A
     BS(A-255):NEXT               :rem 44
1130 POKE1,PEEK(1)OR4:POKE56334,PEEK(5633
     4)OR1:RETURN                 :rem 206
1140 POKE53272,(PEEK(53272)AND240)OR14
                                  :rem 93
1150 RETURN                       :rem 167
1160 DATA247,227,246,193,215,247,235,235,
     255,34,34,34,255,68,68,68     :rem 7
1170 DATA255,231,195,129,129,131,199,255,
     255,191,95,64,90,186,255,255:rem 163
1180 DATA191,121,112,1,0,135,55,115,255,2
     39,247,231,195,195,231,255   :rem 19
1190 DATA255,255,255,255,255,255,255,255,
     255,255,255,129,129,255,255,255
                                  :rem 57
1200 DATA255,255,255,255,255,255,255,255,
     255,253,251,247,143,207,175,255
                                  :rem 38
1210 DATA191,121,112,1,0,135,55,115,255,2
     55,231,0,0,231,255,255        :rem 44
1300 PRINT CHR$(147):POKE BACKGROUND,0:PO
     KE BRDER,0                   :rem 24
1305 READ L,N:IFN=-1THEN GOSUB410:FORTD=1
     TO2500:NEXT:RETURN           :rem 197
1310 FORJ=0TON:READS:POKEL+J,S:NEXT:GOTO1
     305                          :rem 91
1360 DATA1234,17,85,64,73,112,64,110,85,6
     4,75,64,114,64,112,32,32,112,64,75
                                  :rem 160
1370 DATA1274,16,93,32,32,107,64,115,74,6
     4,73,32,93,32,93,32,32,107,64
                                  :rem 174
1380 DATA1314,17,74,64,75,75,32,125,85,64
     ,75,32,75,32,74,64,75,109,64,73
                                  :rem 45
1420 DATA1393,20,114,64,73,73,32,110,85,7
     3,110,85,64,73,112,64,75,85,64,73
                                  :rem 119
1421 DATA85,73                    :rem 229
1430 DATA 110                     :rem 116
1440 DATA1433,20,93,32,93,93,32,93,93,93,
     93,93,64,73,107,64,32,93,32,93,93
                                  :rem 142
1441 DATA93,93                    :rem 232
1450 DATA1473,20,113,64,75,74,64,115,125,
     74,75,74,64,75,109,64,73,74,64,75,12
     5                            :rem 83
1455 DATA 74,75,-1,-1             :rem 0
1500 WAVE=54276:NOISE=129:TRIANGLE=17:VOL
     =54296:SOUND=54272:ATTDEC=54277
                                  :rem 175
1505 BACKGROUND=53281:BRDER=53280:LEVITAT
     E=0:SWRD=0:KEY=0:BOMB=3:LOIN=44
                                  :rem 42
1510 SAW=33:SUSTREL=54278:H1=54273:H2=542
     72:FIGURE=40:BLANK=32        :rem 211
1515 HXSPRITE=53264:LXSPRITE=53248:YSPRIT
     E=53249:POKE 53271,1:POKE 53277,1
                                  :rem 192
1517 POKE 53269,1:FORI=832TO896:POKEI,255
     :NEXT:POKE2040,13            :rem 163
1518 POKE 53287,1:POKE53275,1     :rem 48
1520 FOR I=SOUND TO SOUND+28:POKEI,0:NEXT
     :POKE VOLUME,15:RETURN       :rem 243
3000 I=49152:IF PEEK(I+2)=216THENSYS49160
     :GOTO 3025                   :rem 120
3010 READ A:IF A=256 THENSYS49160:GOTO 30
     25                           :rem 116
3020 POKE I,A:I=I+1:GOTO 3010     :rem 70
3025 FORI=1024TO1062:POKEI,41:POKEI+960,4
     1:NEXT                       :rem 51
3027 FORI=55296TO56295:POKEI,0:NEXT:RETUR
     N                            :rem 147
3030 DATA 1,0,216,255,255,255,40  :rem 26
3040 DATA 0,169,41,133,251,169,40 :rem 81
3050 DATA 133,253,169,4,133,252,133
                                  :rem 182
3060 DATA 254,169,147,32,210,255,162
                                  :rem 239
3070 DATA 0,160,0,169,41 ,145,253 :rem 28
3080 DATA 200,192,39,208,249,24,165
                                  :rem 194
3090 DATA 253,105,40,133,253,144,2
                                  :rem 126
3100 DATA 230,254,232,224,23,208,229
                                  :rem 225
3110 DATA 160,0,169,4,145,251,169 :rem 84
3120 DATA 255,141,15,212,169,128,141
                                  :rem 230
3130 DATA 18,212,173,27,212,41,3  :rem 24
3140 DATA 133,173,170,10,168,24,185
                                  :rem 184
3150 DATA 0,192,101,251,133,170,185
                                  :rem 174
3160 DATA 1,192,101,252,133,171,24
                                  :rem 122
3170 DATA 185,0,192,101,170,133,253
                                  :rem 178
3180 DATA 185,1,192,101,171,133,254
                                  :rem 182
3190 DATA 160,0,177,253,201,41,208
                                  :rem 129
3200 DATA 18,138,145,253,169,32,145
                                  :rem 191
3210 DATA 170,165,253,133,251,165,254
                                  :rem 28
3220 DATA 133,252,76,62,192,232,138
                                  :rem 189
3230 DATA 41,3,197,173,208,189,177
                                  :rem 153
3240 DATA 251,170,169,32,145,251,224
                                  :rem 234
3250 DATA 4,240,26,138,10,168,162 :rem 83
3260 DATA 2,56,165,251,249,0,192  :rem 41
3270 DATA 133,251,165,252,249,1,192
                                  :rem 190
3280 DATA 133,252,202,208,238,76,62
                                  :rem 191
3290 DATA 192,169,1,160,0,153,0   :rem 237
3300 DATA 216,153,0,217,153,0,218 :rem 72
3310 DATA 153,0,219,200,208,241,96,256
                                  :rem 73
```

```
4000 REM CHARACTER PLACEMENTS      :rem 33
4010 T=32:Q=42:FOR I=1 TO 7:GOSUB 4100:NE
     XT                            :rem 147
4020 Q=44:FOR I=1 TO 6:GOSUB 4100:NEXT
                                   :rem 101
4030 Q=45:FOR I=1 TO 3:GOSUB 4100:NEXT
                                   :rem 100
4040 Q=43:FOR I=1 TO 2:GOSUB 4100:NEXT
                                   :rem 98
4050 Q=47:FOR I=1 TO 5             :rem 114
4055 GOSUB 4100                    :rem 19
4060 IF(PEEK(PLACE-40)<>32)OR(PEEK(PLACE+
     40)<>32)THENPOKEPLACE,BLANK:GOTO4055
                                   :rem 200
4070 NEXT                          :rem 10
4080 Q=49:GOSUB 4100               :rem 70
4090 Q=FIGURE:GOSUB 4100:MAN=PLACE:rem 84
4095 T=41:Q=32:FORI=1TO50:GOSUB 4100:NEXT
     :RETURN                       :rem 231
4100 X=(RND(1)*36+2):Y=INT(RND(1)*20+3):P
     L=Y*40+X+1024:IFPEEK(PLACE)<>TTHEN41
     00                            :rem 50
4110 POKE PLACE,Q:RETURN           :rem 241
5000 PRINT"{CLR}{11 DOWN}{14 RIGHT}{RVS}P
     LEASE WAIT"                   :rem 123
5010 RETURN                        :rem 166
```

Revenge Of Cyon

See article on page 56.

BEFORE TYPING...

Before typing in programs, please refer to "How To Type COMPUTE!'s Gazette Programs," "A Beginner's Guide To Typing In Programs," and "The Automatic Proofreader" that appear before the Program Listings.

Program 1: VIC Version

```
1 DIMJS(2,2):POKE37139,0:DD=37154:PA=3713
  7:PB=37152:V$=" SECONDS"         :rem 180
2 FORI=0TO2:FORJ=0TO2:READJS(J,I):NEXT:NE
  XT:FORT=0TO10:READB$(T):NEXT     :rem 6
3 CO=30720:SC=7680:BG=1:BE=7955    :rem 233
4 POKE36879,255:PRINT"{CLR}{6 DOWN}
  {3 RIGHT}{RVS}{PUR}REVENGE OF CYON{BLU}
  {OFF}":PRINT"{5 DOWN}{RIGHT}SKILL LEVEL
   (1-6) ?";                       :rem 163
5 GETA$:IFA$=""THEN5               :rem 141
6 D=VAL(A$):IFD<1ORD>6THEN4        :rem 134
7 PRINT"{CLR}":POKE36879,8:A=32:A1=32:A2=
  32                               :rem 51
8 FORI=0TO220:POKE38796+I,5:NEXT:POKE3877
  5,2:FORP=1TO20:POKE38778+P,5:NEXT:POKE3
  8767,6                           :rem 54
9 PRINT"{HOME}"BG:J=0:K=0:VB=0:POKE7708,4
  6:POKE7818,46:POKE7738,46:POKE7727,81:T
  H=0:S=0                          :rem 94
10 POKE8076,78:POKE8077,99:POKE8078,77:PO
   KE8101,77:POKE8102,100:POKE8103,78
                                   :rem 69
11 POKE8104,99:POKE8083,78:POKE8084,99:PO
   KE8063,78:POKE8064,77:POKE8086,103:POK
   E8109,77                        :rem 44
12 POKE8110,79:POKE8089,79:POKE8068,78:PO
   KE8069,99:POKE8070,77:POKE8093,80:POKE
   8132,77                         :rem 2
13 POKE8133,100:POKE8134,100:POKE8135,100
   :POKE8136,100:POKE8137,78:POKE8115,103
                                   :rem 211
14 POKE8094,78:POKE8073,78:POKE8074,77:PO
   KE8075,78:POKE8112,108:POKE8113,123
                                   :rem 122
15 POKE8152,32:POKE8055,88:POKE8047,93:PO
   KE7782,46:POKE7901,46:POKE7691,46:POKE
   8025,87                         :rem 241
16 POKE38745,4                      :rem 1
17 POKE36878,15:FORL=1TO5:FORM=180TO235ST
   EP2:POKE36876,M:FORN=1TO10:NEXT:rem 37
18 NEXT:POKE36876,0:FORM=1TO50:NEXT:NEXT:
   POKE36878,0:PRINT"{HOME}{3 SPACES}"
                                   :rem 68
19 FORN=1TO2:POKE8115-N,46:FORQ=1TO120:NE
   XT:POKE8115-N,32:NEXT:LK=0:TI$="000000
   "                               :rem 81
20 POKEBE+VB,A                     :rem 72
21 POKEDD,127:S3=-((PEEK(PB)AND128)=0):PO
   KEDD,255                        :rem 72
22 P=PEEK(PA):S1=-((PAND8)=0):S2=((PAND16
   )=0):S0=((PAND4)=0)             :rem 127
23 FR=-((PAND32)=0):X=S2+S3:Y=S0+S1:IFLK>
   8164THEN60                      :rem 11
24 C=C+1:IFFR=1THENTH=TH+1         :rem 84
25 POKELK+PO+CO,D1:IFA1<>43THENPOKELK+PO,
   A1                              :rem 206
26 IFBG>6ANDJ<>1THENPOKELK+PO+30726,D2:IF
   A2<>43THENPOKELK+PO+6,A2        :rem 38
27 IFK<>1THENLK=INT(RND(1)*150)+SC:rem 20
28 POKE8025,81:POKE36878,0:IFFR=1ANDTH<=7
   THENGOSUB46                     :rem 217
29 K=1:PO=INT(RND(1)*D)+1:IFTH>7THENFR=0
                                   :rem 180
30 POKE36878,0:VB=VB+JS(X+1,Y+1)+(VB>220)
   *22-(VB<-264)*22                :rem 112
31 A=PEEK(BE+VB):POKEBE+VB,43:IFC=2THENLK
   =LK+22:C=0                      :rem 118
32 A1=PEEK(LK+PO):D1=PEEK(LK+PO+CO)
                                   :rem 107
33 IFBG>6ANDJ<>1THENA2=PEEK(LK+PO+6):D2=P
   EEK(LK+PO+30726)                :rem 194
34 IFS<>1THENPOKELK+PO+CO,7:POKELK+PO,90
                                   :rem 50
35 A$="SHOTS":IFTH=1THENA$="SHOT " :rem 5
36 PRINT"{HOME}";:XC=BE+VB:IFXC=LK+POANDF
   R=1THENPRINTTH;A$:PRINTRIGHT$(TI$,2)V$
   :GOTO49                         :rem 234
37 IFBG>6ANDJ<>1THENPOKELK+PO+30726,7:POK
   ELK+PO+6,90                     :rem 205
38 IFBG>6ANDJ<>1ANDXC=LK+PO+6ANDFR=1THENP
   RINTTH;A$:PRINTRIGHT$(TI$,2)V$:GOSUB41
                                   :rem 111
39 POKE8025,87:IFJ=1ANDS=1THENBG=BG+1:GOT
   O47                             :rem 210
40 POKESC+QW,32:QW=INT(RND(1)*176)+44:POK
   ESC+QW,46:GOTO20                :rem 230
41 POKE36878,15:FORW=1TO6:FORY=220TO254:P
   OKE36876,Y:NEXT:NEXT:POKELK+PO+CO+6,1
                                   :rem 177
42 POKELK+PO+6,43                  :rem 234
43 FORZ=22TOLK-SCSTEP22:G=PEEK(LK+PO-Z+6)
   :G1=PEEK(LK+PO-Z+CO+6):POKELK+PO-Z+CO+
   6,7                             :rem 160
44 POKELK+PO-Z+6,90:FORH=1TO70:NEXT:POKEL
   K+PO-Z+CO+6,G1:POKELK+PO-Z+6,G:NEXT
                                   :rem 128
45 TH=0:J=1:RETURN                 :rem 126
46 POKE36878,15:POKE36876,244:FORFV=1TO70
   :NEXT:POKE36878,0:RETURN        :rem 21
```

```
47 IFBG<=11THEN7                          :rem 196
48 GOTO76                                 :rem 18
49 IFBG>6ANDJ<>1THENPOKELK+PO+CO+6,7:POKE
   LK+PO+6,90                             :rem 193
50 S=1:POKE36878,15:FORL=1TO15:FORM=250TO
   240STEP-1:POKE36876,M:NEXT             :rem 147
51 FORM=240TO250:POKE36876,M:NEXT:POKE368
   76,0:NEXT:POKE36878,0:POKELK+PO+CO,1:T
   H=0                                    :rem 88
52 POKELK+PO,43                           :rem 138
53 FORZ=22TOLK-SCSTEP22:G=PEEK(LK+PO-Z):G
   1=PEEK(LK+PO-Z+CO):POKELK+PO-Z+CO,7
                                          :rem 126
54 POKELK+PO-Z,90:FORH=1TO70:NEXT:POKELK+
   PO-Z+CO,G1:POKELK+PO-Z,G:NEXT          :rem 94
55 POKE36876,0                            :rem 3
56 IFBG<7THENBG=BG+1:GOTO7                :rem 122
57 IFJ=1ANDS=1THENBG=BG+1:IFBG<12THEN7
                                          :rem 120
58 IFJ=1ANDS=1ANDBG=12THEN76              :rem 224
59 GOTO37                                 :rem 17
60 JH=JH+1:IFJH<3THEN7                    :rem 83
61 POKE36876,0:POKE36877,220:FORL=15TO0ST
   EP-1:POKE36878,L:FORZN=1TO50            :rem 229
62 POKE36879,ZN:NEXT:NEXT:POKE36877,0:POK
   E36878,0                               :rem 23
63 PRINT"{CLR}":FORZN=8TO255:POKE36879,ZN
   :NEXT                                  :rem 17
64 PRINT"{2 DOWN}{3 RIGHT}{GRN}YOU SURVIV
   ED"BG-1:PRINT"{4 RIGHT}ATTACK WAVES.":
   GOSUB69                                :rem 66
65 PRINT"{2 DOWN}{RVS}{BLU}PLAY AGAIN?(Y,
   N){OFF}"                               :rem 26
66 GETA$:IFA$=""THEN66                    :rem 251
67 IFA$="Y"THENRUN                        :rem 95
68 END                                    :rem 69
69 PRINT"{DOWN}{3 RIGHT}YOUR RANK IS:":PR
   INT"{DOWN}{4 RIGHT}"B$(BG-1)"{GRN}.":R
   ETURN                                  :rem 209
70 DATA-23,-22,-21,-1,0,1,21,22,23
                                          :rem 127
71 DATA"PRIVATE{BLU}","{RED}CORPORAL{BLU}
   ","{CYN}SERGEANT{BLU}"                 :rem 148
72 DATA"{PUR}SECOND LIEUTENANT {BLU}","
   {BLK}FIRST LIEUTENANT"                 :rem 184
73 DATA"{RED}CAPTAIN{BLU}","{BLK}MAJOR
   {BLU}","{PUR}COLONEL{BLU}"             :rem 210
74 DATA"{PUR}GENERAL{BLU}","{BLK}FIELD MA
   RSHALL{BLU}"                           :rem 89
75 DATA"{RED}MR. PRESIDENT"               :rem 97
76 PRINT"{CLR}{RED}YOU HAVE SAVED EARTH
   {2 SPACES}FROM THE ALIEN ATTACK!{BLU}"
   :GOTO65                                :rem 73
```

Program 2: 64 Version

```
100 CO=54272:FORT=COTOCO+24:POKET,0:NEXT
                                          :rem 0
110 POKE53280,0:POKE53281,1:V$=" SECONDS"
                                          :rem 44
120 PRINT"{CLR}{7 DOWN}"TAB(12)"{RVS}
    {RED}REVENGE OF CYON{OFF}"            :rem 215
130 PRINT"{2 DOWN}"TAB(11)"{BLU}(USE JOYS
    TICK #2)"                             :rem 119
140 PRINT"{5 DOWN}{8 RIGHT}WHAT SKILL LEV
    EL (1-6)?"                            :rem 242
150 GETA$:IFA$<"1"ORA$>"6"THEN150         :rem 61
160 D=VAL(A$):SC=1024                     :rem 133
170 POKECO+24,15:POKECO+5,17:POKECO+6,248
    :POKECO,100                           :rem 73
180 BG=1                                  :rem 144
190 POKE53281,1:PRINT"{CLR}":POKE53281,0:
    PRINT"{CYN}"BG:TI$="000000"           :rem 94
200 LK=INT(RND(1)*150)+SC                 :rem 137
210 FORI=1TO10:O=1064+INT(RND(1)*520):POK
    EO,46:POKEO+CO,1:NEXT                 :rem 237
220 POKE1154,81:POKE1154+CO,1             :rem 113
230 PRINT"{13 DOWN}"                      :rem 67
240 PRINT"{GRN}{6 DOWN}N{2 T}{UP}{LEFT}
    {RED}X{GRN}{DOWN}{T}M{DOWN}M{2 @}
    N{UP}N{UP}N{2 T}{UP}N{UP}N{2 T}M
    {DOWN}M{DOWN}M{DOWN}M{DOWN}M{7 @}N
    {UP}N{UP}NM{DOWN}M{2 @}N{UP}N{UP}N
    {T}"                                  :rem 43
250 PRINT"{21 RIGHT}N{UP}{G}{UP}{LEFT}
    {@}N{2 T}{UP}{LEFT}{BLU}-{GRN}
    {DOWN}{T}M{@}{DOWN}{LEFT}{M}
    {DOWN}M"                              :rem 83
260 POKE1769,87:POKE1769+CO,4:POKE1887,12
    4:POKE1887+CO,5                       :rem 249
270 FORI=1890TO1887STEP-1:POKEI+1,32:POKE
    I+CO+1,0:POKEI,124:POKEI+CO,5:rem 248
280 FORJ=1TO80:NEXTJ,I                    :rem 124
290 J=0:K=0                               :rem 68
300 X=20:Y=12:TH=0:S1=0:A=32:A1=32:A2=32
                                          :rem 229
310 FORW=1TO3:FORI=10TO200STEP10:POKECO+1
    ,I:POKECO+4,33:FORJ=1TO10:NEXTJ,I,W
                                          :rem 64
320 PRINT"{HOME}{DOWN}{4 SPACES}":rem 138
330 POKECO+4,32                           :rem 71
340 S=1524                                :rem 243
350 POKES,A                               :rem 135
360 P=PEEK(56320)AND15:Y=Y+((PAND1)=0)-((
    PAND2)=0):X=X+((PAND4)=0)-((PAND8)=0)
                                          :rem 108
370 FR=PEEK(56320)AND16:IFX<0THENX=39
                                          :rem 220
380 IFY<0THENY=0                          :rem 228
390 IFX>39THENX=0                         :rem 33
400 IFY>24THENY=24                        :rem 75
410 IFLK>1983THEN610                      :rem 148
420 C=C+1:IFFR=0THENTH=TH+1               :rem 131
430 POKELK+CO+PO,D1:IFA1<>43THENPOKELK+PO
    ,A1                                   :rem 254
440 IFBG>6ANDJ<>1THENPOKELK+CO+PO+6,D2:IF
    A2<>43THENPOKELK+PO+6,A2              :rem 71
450 IFFR=0ANDTH<=7THENGOSUB1030           :rem 191
460 PO=INT(RND(1)*D)+1:IFTH>7THENFR=1
                                          :rem 241
470 POKEOS,32:NS=1064+INT(RND(1)*520):POK
    ENS,46:OS=NS                          :rem 200
480 S=SC+X+Y*40                           :rem 87
490 A=PEEK(S):POKES,43:IFC=2THENLK=LK+40:
    C=0                                   :rem 193
500 A1=PEEK(LK+PO):D1=PEEK(LK+PO+CO)
                                          :rem 155
510 IFBG>6ANDJ<>1THENA2=PEEK(LK+PO+6):D2=
    PEEK(LK+PO+CO+6)                      :rem 227
520 IFS1<>1THENPOKELK+PO+CO,7:POKELK+PO,9
    0                                     :rem 147
530 A$="SHOTS":IFTH=1THENA$="SHOT "
                                          :rem 53
540 PRINT"{HOME}{BLU}";:IFS=LK+POANDFR=0T
    HENPRINTTH;A$:PRINTRIGHT$(TI$,2)V$:GO
    TO910                                 :rem 193
550 IFBG>6ANDJ<>1THENPOKELK+PO+CO+6,7:POK
    ELK+PO+6,90                           :rem 238
560 IFBG>6ANDJ<>1ANDS=LK+PO+6ANDFR=0THENP
    RINTTH;A$:PRINTRIGHT$(TI$,2);:GOSUB86
    0                                     :rem 80
570 IFPEEK(1769)=87THENPOKE1769,81:POKE17
    69+CO,4:GOTO590                       :rem 92
```

```
580 POKE1769,87:POKE1769+CO,4      :rem 155
590 IFJ=1ANDS1=1THENBG=BG+1:GOTO1040
                                   :rem 188
600 POKESC+QW,32:QW=INT(RND(1)*360)+80:PO
    KESC+QW,46:GOTO350             :rem 73
610 JH=JH+1:IFJH<3THEN190          :rem 231
620 POKECO+1,10:POKECO+4,129       :rem 100
630 FORI=0TO15:FORJ=0TO15:POKE53280,I:POK
    E53281,J:NEXTJ,I               :rem 26
640 POKE53280,0:POKE53281,0        :rem 239
650 POKECO+4,128                   :rem 130
660 PRINT"{CLR}{7 DOWN}{CYN}{6 RIGHT}YOU
    {SPACE}SURVIVED"BG-1"ATTACK WAVES.
    {7 DOWN}"                      :rem 71
670 ONBGGOSUB730,740,750,760,770,780,790,
    800,810,820,830                :rem 172
680 PRINT"{YEL}{5 DOWN}{11 RIGHT}PLAY AGA
    IN (Y/N)?"                     :rem 157
690 GETA$:IFA$=""THEN690           :rem 97
700 IFA$="Y"THENRUN                :rem 137
710 IFA$="N"THENEND                :rem 97
720 GOTO690                        :rem 113
730 PRINT"{PUR}{13 RIGHT}SORRY, PRIVATE."
    :RETURN                        :rem 174
740 PRINT"{PUR}{10 RIGHT}NOT TOO BAD, COR
    PORAL.":RETURN                 :rem 170
750 PRINT"{PUR}{10 RIGHT}NICE GOING, SERG
    EANT.":RETURN                  :rem 139
760 PRINT"{PUR}{6 RIGHT}WAY TO GO, SECOND
     LIEUTENANT.":RETURN           :rem 11
770 PRINT"{PUR}{6 RIGHT}YOU ARE NOW FIRST
     LIEUTENANT.":RETURN           :rem 75
780 PRINT"{PUR}{10 RIGHT}YOU ARE NOW A CA
    PTAIN.":RETURN                 :rem 128
790 PRINT"{PUR}{11 RIGHT}YOU ARE NOW A MA
    JOR.":RETURN                   :rem 23
800 PRINT"{PUR}{9 RIGHT}YOU ARE NOW A COL
    ONEL.":RETURN                  :rem 104
810 PRINT"{PUR}{9 RIGHT}YOU ARE NOW A GEN
    ERAL.":RETURN                  :rem 91
820 PRINT"{PUR}{6 RIGHT}YOU ARE NOW A FIE
    LD MARSHALL.":RETURN           :rem 191
830 PRINT"{PUR}{10 RIGHT}HELLO, MR. PRESI
    DENT.":RETURN                  :rem 141
840 PRINT"{CLR}{YEL}{8 DOWN}{RIGHT}YOU SA
    VED THE EARTH FROM ALIEN ATTACK!!
    {7 DOWN}"                      :rem 22
850 GOTO 680                       :rem 116
860 FORF=1TO3:FORL=150TO100STEP-1:POKECO+
    1,L:POKECO+4,17:NEXT:NEXT:POKECO+4,16
                                   :rem 185
870 PRINTV$:POKELK+PO+CO+6,1:POKELK+PO+6,
    43                             :rem 169
880 FORZ=40TOLK-SCSTEP40:G=PEEK(LK+PO-Z+6
    ):G1=PEEK(LK+PO-Z+CO+6)        :rem 7
890 POKELK+PO-Z+CO+6,7:POKELK+PO-Z+6,90:F
    ORH=1TO70:NEXT:POKELK+PO-Z+CO+6,G1
                                   :rem 237
900 POKELK+PO-Z+6,G:NEXT:TH=0:J=1:RETURN
                                   :rem 76
910 IFBG>6ANDJ<>1THENPOKELK+PO+CO+6,7:POK
    ELK+PO+6,90                    :rem 238
920 S1=1                           :rem 141
930 FORT=1TO3:FORTY=100TO150:POKECO+1,TY:
    POKECO+4,17:NEXT:NEXT:POKECO+4,16
                                   :rem 237
940 S1=1:POKELK+PO+CO,1:TH=0:POKELK+PO,43
                                   :rem 19
950 FORZ=40TOLK-SCSTEP40:G=PEEK(LK+PO-Z):
    G1=PEEK(LK+PO-Z+CO)            :rem 67
960 POKELK+PO-Z+CO,7:POKELK+PO-Z,90:FORH=
    1TO70:NEXT:POKELK+PO-Z+CO,G1   :rem 200
970 POKELK+PO-Z,G:NEXT             :rem 163
980 IFBG<7THENBG=BG+1:GOTO190      :rem 19
990 IFJ=1ANDS=1THENBG=BG+1:IFBG<12THEN190
                                   :rem 17
1000 IFJ=1ANDS=1ANDBG=12THEN840    :rem 99
1010 GOTO550                       :rem 149
1020 REM FIRE NOISE                :rem 75
1030 POKECO+1,200:POKE CO+4,129:POKECO+4,
     128:FORT=1TO100:NEXT:RETURN   :rem 140
1040 IFBG<=11THEN190               :rem 129
1050 GOTO840                       :rem 155
```

Therapy

See article on page 78.

BEFORE TYPING...

Before typing in programs, please refer to "How To Type COMPUTE!'s Gazette Programs," "A Beginner's Guide To Typing In Programs," and "The Automatic Proofreader" that appear before the Program Listings.

Program 1: Therapy—64 Version

```
100 PRINTCHR$(142)CHR$(8)CHR$(30):POKE532
    81,0:POKE53280,0:GOSUB1230:POKE198,0
                                   :rem 188
105 Q=0:QD=0                       :rem 144
110 PRINTCHR$(147);"HELLO. I'M DR. ROM. W
    HAT'S YOUR NAME?"              :rem 40
115 GOSUB1160:A$=P1$:PRINT         :rem 39
120 PRINT"IN ONE WORD, ";A$;",":PRINT"WHA
    T IS YOUR PROBLEM?":GOSUB1160:B$=P1$
                                   :rem 14
130 PRINT:PRINTB$;"...?":PRINT:PRINT"CAN
    {SPACE}YOU TELL ME MORE?"      :rem 108
140 GOSUB1160:GOSUB900             :rem 48
150 PRINT:PRINT"I UNDERSTAND ";B$;" IS DI
    FFICULT":PRINT"FOR YOU."       :rem 226
160 GOSUB1160:IFP1$="NO"THENPRINT"MAYBE I
    'M NOT QUITE UNDERSTANDING..."
                                   :rem 111
170 PRINT:PRINT"CAN YOU BE MORE SPECIFIC?
     HOW IS":PRINTB$;" A PROBLEM FOR YOU?
    "                              :rem 233
180 GOSUB1160:GOSUB900             :rem 52
190 PRINT:PRINT"HOW DOES THIS MAKE YOU FE
    EL, ";A$;"?":GOSUB1160:C$=P1$  :rem 73
200 PRINTCHR$(147)                 :rem 13
205 PRINT"SO WHAT YOU'RE SAYING, ";A$;","
    :PRINT"IS THAT YOUR PROBLEM WITH ";B$
                                   :rem 80
210 PRINT"IS MAKING YOU FEEL ";C$;".":GOS
    UB1160                         :rem 161
220 PRINT:PRINT"CAN YOU ELABORATE ON YOUR
     FEELINGS?":GOSUB1160:GOSUB900
                                   :rem 215
230 PRINT:PRINT"HAS THIS BEEN A PROBLEM F
    OR YOU BEFORE? (YES OR NO)":GOSUB1160
                                   :rem 133
240 IFP1$<>"NO"THEN260             :rem 236
250 PRINT"I SEE. THEN THIS NEW SITUATION
    {SPACE}MUST BE{2 SPACES}DIFFICULT FOR
     YOU.":GOTO320                 :rem 81
260 PRINT:PRINT"DID YOU ALSO FEEL ";C$;"
    {SPACE}THEN?"                  :rem 216
270 GOSUB1160:PRINT"TELL ME MORE.":rem 16
280 GOSUB1160:GOSUB900             :rem 53
```

```
290 PRINTCHR$(147)"I THINK WE HAVE SOMETH
    ING HERE. DO YOU{2 SPACES}SEE A PATTE
    RN?"                              :rem 236
300 GOSUB1160:PRINT:PRINT"GO ON..."
                                      :rem 106
310 GOSUB1160:PRINT:PRINT"THIS SOUNDS DIF
    FICULT FOR YOU.":GOSUB1160        :rem 240
320 PRINT:PRINT"DO YOU HAVE A PLAN TO DEA
    L WITH THIS{4 SPACES}CURRENT SITUATIO
    N?"                               :rem 156
330 PRINT"YES OR NO.":GOSUB1160       :rem 70
340 IFP1$<>"YES"THEN350               :rem 65
343 PRINT"DO YOU THINK THIS PLAN WILL BE"
    :PRINT"SUCCESSFUL?":GOTO360       :rem 241
350 PRINT:PRINT"WHY DON'T YOU MAKE A LIST
     OF POSSIBLE{3 SPACES}SOLUTIONS, THEN
    ."                                :rem 107
360 GOSUB1160:GOSUB900                :rem 52
370 FORT=1TO500:NEXTT:PRINTCHR$(147)
                                      :rem 253
380 PRINT"OKAY, WHAT SINGLE WORD BEST DES
    CRIBES"                           :rem 192
385 PRINT"HOW YOU ARE FEELING RIGHT NOW?"
                                      :rem 223
390 GOSUB1160:D$=P1$::PRINT:PRINTD$;"...?
    "                                 :rem 224
400 GOSUB1160:GOSUB900:PRINT          :rem 246
410 PRINT"I'M THINKING OF DOING SOMETHING
     HERE.{3 SPACES}LET'S TRY SOME WORD";
                                      :rem 142
430 PRINT" ASSOCIATION":PRINT"AND SEE WHE
    RE IT LEADS US."                  :rem 183
440 PRINT"WHAT DO YOU THINK(YES OR NO)?":
    GOSUB1160                         :rem 236
450 IFP1$="YES"THEN490                :rem 11
460 PRINT:PRINT"YOU SEEM TO BE HAVING SOM
    E PROBLEMS WITHTHIS."             :rem 122
470 PRINT"CAN YOU TELL ME ABOUT IT?":GOSU
    B1160:IFP1$="NO"THEN840           :rem 46
480 PRINT:PRINT"I REALLY THINK A WORD ASS
    OCIATION WOULD BE USEFUL RIGHT NOW."
                                      :rem 4
490 PRINT:PRINT"LET'S DO IT."         :rem 242
500 PRINT"I'LL SAY A WORD. YOU SAY THE FI
    RST WORD THAT COMES TO YOUR MIND."
                                      :rem 133
510 REM ***WORD ASSOCIATION***        :rem 239
520 FORT=1TO5000:NEXTT:PRINTCHR$(147);"DO
    G":PRINT:GOSUB1160                :rem 204
530 PRINT:PRINT"DRINK":PRINT:GOSUB1160
                                      :rem 241
540 PRINT:PRINT"HOME":PRINT:GOSUB1160:E$=
    P1$                               :rem 40
550 PRINT:PRINTB$:PRINT:GOSUB1160:F$=P1$
                                      :rem 35
560 PRINT:PRINT"FEELINGS":PRINT:GOSUB1160
                                      :rem 201
570 PRINT:PRINT"FUN":PRINT:GOSUB1160:G$=P
    1$                                :rem 237
580 PRINT:PRINT"MOM":PRINT:GOSUB1160:I$=P
    1$                                :rem 240
590 PRINT:PRINTC$:PRINT:GOSUB1160:J$=P1$
                                      :rem 44
600 FORT=1TO1000:NEXTT:PRINTCHR$(147)
                                      :rem 37
610 PRINT"I NOTICED WHEN I SAID HOME":PRI
    NT"THAT YOU SAID ";E$;"."         :rem 39
620 PRINT"DOES THIS SOMEHOW REFLECT HOW Y
    OU FEEL{2 SPACES}ABOUT YOURSELF?"
                                      :rem 45
630 PRINT"YES OR NO":GOSUB1160:IFP1$<>"YE
    S"THEN650                         :rem 2
640 PRINT:PRINT"IN WHAT WAY?":GOSUB1160:G
    OSUB900                           :rem 2
650 PRINT:PRINT"HOW DOES THIS RELATE TO Y
    OUR PROBLEM":PRINT"WITH ";B$      :rem 44
660 GOSUB1160:GOSUB900:PRINT:PRINT"WHEN I
     SAID ";B$;" YOU SAID ";F$        :rem 136
670 PRINT"WHAT DO YOU THINK THIS MEANS?":
    GOSUB1160:GOSUB900                :rem 112
680 PRINT:PRINT"ARE YOU DISTRESSED? DO YO
    U WANT A{7 SPACES}KLEENEX?":GOSUB1160
                                      :rem 28
690 IFP1$<>"YES"THEN710               :rem 73
700 PRINT"HERE.":FORT=1TO1000:NEXTT
                                      :rem 206
710 PRINT:PRINT"IT'S INTERESTING THAT WHE
    N I SAID FUN,{2 SPACES}YOU SAID ";G$
                                      :rem 57
720 GOSUB1160:GOSUB900:PRINTCHR$(147);"HM
    MMM..."                           :rem 110
730 PRINT:PRINT"IT SEEMS TO ME, ";A$;","
                                      :rem 248
735 PRINT"THAT THIS ALL TIES IN TO YOUR P
    ROBLEM"                           :rem 129
740 PRINT"WITH ";B$                   :rem 73
750 GOSUB1160:GOTO770                 :rem 245
760 REM ***DREAMS***                  :rem 57
770 PRINT:PRINT"LET'S TRY A DIFFERENT":PR
    INT"APPROACH,";A$                 :rem 145
780 PRINT"TELL ME ABOUT ONE OF YOUR DREAM
    S.":GOSUB1160:GOSUB1040:IFQD=1THEN840
                                      :rem 246
790 PRINT:PRINT"HOW WOULD YOU DESCRIBE YO
    UR FEELINGS{4 SPACES}IN THE DREAM?"
                                      :rem 171
791 GOSUB1160                         :rem 233
800 PRINT:PRINT"DID THE DREAM HAVE ANYTHI
    NG TO DO WITH{2 SPACES}";I$       :rem 235
810 GOSUB1160:FORT=1TO1000:NEXTT      :rem 245
820 REM ***ALL DONE***                :rem 121
830 PRINT:PRINT"I THINK WE'RE MOVING IN A
    {15 SPACES}GOOD DIRECTION.":PRINT
                                      :rem 187
840 PRINT"WE'VE DISCUSSED YOUR PROBLEM WI
    TH":PRINTB$;" AND HOW THIS MAKES YOU
                                      :rem 255
850 PRINT"FEEL ";C$;";"               :rem 230
860 PRINT"AND DISCUSSED SOME POSSIBLE SOL
    UTIONS."                          :rem 124
870 PRINT:PRINT"I SEE YOUR TIME IS UP.
    {18 SPACES}SEE YOU NEXT WEEK."
                                      :rem 189
880 END                               :rem 119
890 REM ***KEYWORDS***                :rem 249
900 IFQ>0THENRETURN                   :rem 246
910 FORJ=1TOLEN(P1$)-5                :rem 19
920 IFMID$(P1$,J,5)<>" FUN "THEN930
                                      :rem 103
925 PRINT:PRINT"WHAT ARE YOUR FEELINGS AB
    OUT FUN?":GOTO950                 :rem 148
930 NEXTJ                             :rem 37
940 RETURN                            :rem 125
950 GOSUB1160:Q=1:PRINT:PRINT"THESE FEELI
    NGS SEEM IMPORTANT."              :rem 141
960 GOSUB1160:RETURN                  :rem 1
1040 REM ***DREAM KEYWORD SEARCH***
                                      :rem 233
1050 FORJ=1TOLEN(P1$)-7               :rem 65
1060 IFMID$(P1$,J,7)=" DON'T "THEN1120
                                      :rem 243
1070 NEXTJ                            :rem 81
```

```
1080 FORJ=1TOLEN(P1$)-6                :rem 67
1090 IFMID$(P1$,J,6)=" DONT "THEN1120
                                       :rem 206
1100 NEXTJ                             :rem 75
1110 RETURN                            :rem 163
1120 PRINTCHR$(147)"WHY DO YOU SUPPOSE TH
     AT IS?":GOSUB1160:GOSUB900        :rem 27
1130 PRINT"THIS MAY BE SOMETHING THAT WE'
     LL WANT"                          :rem 176
1140 PRINT"TO DISCUSS LATER. WE MAY FIND
     {SPACE}THAT IT"                   :rem 112
1150 PRINT"RELATES TO YOUR PROBLEM WITH "
     ;B$:QD=1:RETURN                   :rem 223
1160 REM ***COMMODORE PUNCTUATION INPUT**
     *                                 :rem 55
1170 P1$=""                            :rem 239
1180 GETP2$:IFP2$=""THEN1180          :rem 57
1190 PRINTP2$;                         :rem 57
1200 IFP2$=CHR$(13)THENRETURN          :rem 250
1210 P1$=P1$+P2$                       :rem 28
1220 GOTO1180                          :rem 200
1230 REM ***INTRODUCTION***            :rem 72
1240 PRINTCHR$(147);TAB(15)"THERAPY"
                                       :rem 108
1250 PRINT:PRINT"WOULD YOU LIKE AN INTROD
     UCTION (Y/N)"                     :rem 101
1260 GETQ$:IFQ$<>"Y"ANDQ$<>"N"THEN1260
                                       :rem 191
1270 IFQ$="N"THENRETURN                :rem 172
1280 PRINTCHR$(147);"WELCOME TO YOUR THER
     APY SESSION. DR. ROM";            :rem 31
1285 PRINT"WILL BE WITH YOU IN A ";
                                       :rem 172
1290 PRINT"MOMENT. WHILE YOU ARE WAITING,
      HERE ARE SOME HELPFUL"           :rem 104
1300 PRINT"SUGGESTIONS ON HOW TO GET THE
     {SPACE}MOST OUT{2 SPACES}OF YOUR THE
     RAPY SESSION."                    :rem 109
1305 PRINT:PRINT                       :rem 29
1310 PRINT"AS WITH MOST THINGS IN LIFE, W
     ITH{7 SPACES}THERAPY, THE MORE YOU "
     ;                                 :rem 42
1320 PRINT"PUT IN, THE MORE{2 SPACES}YOU
     {SPACE}GET OUT. YOU MAY FIND IT FUN
     {SPACE}TO TRY AND TRIP";          :rem 228
1330 PRINT" UP THE DOCTOR; MAKE FUN OF HI
     S GRAMMAR, OR INSULT HIM MERCILESSLY
     ."                                :rem 175
1340 PRINT"{DOWN}HOWEVER, EVEN THOUGH THI
     S IS A PARLOR{3 SPACES}GAME, YOU MAY
      STILL FIND ";                    :rem 230
1350 PRINT"YOURSELF HAVINGINTERESTING, AN
     D EVEN IMPORTANT,"                :rem 51
1360 PRINT"INSIGHTS. THIS WILL ONLY HAPPE
     N IF YOU{2 SPACES}TRY YOUR BEST TO U
     TILIZE ";                         :rem 172
1370 PRINT"THIS SESSION ASAN ENJOYABLE WA
     Y TO MULL OVER THE"               :rem 159
1380 PRINT"PROBLEMS AND PEEVES OF LIFE."
                                       :rem 127
1390 PRINT:PRINT:PRINTCHR$(18)"HIT ANY KE
     Y TO CONTINUE"                    :rem 165
1400 POKE198,0:WAIT198,1               :rem 96
1410 PRINTCHR$(147):PRINT:PRINT"I SEE THE
      DOCTOR IS IN NOW."               :rem 58
1420 PRINT:PRINT:PRINT"TO TALK TO DR. ROM
     , JUST TYPE IN YOUR"              :rem 228
1430 PRINT"RESPONSE; AND HIT ";CHR$(18);"
     RETURN";CHR$(146);" WHEN YOU ARE"
                                       :rem 254
1440 PRINT"FINISHED.":PRINT:PRINT:PRINT"E
     NJOY YOUR THERAPY SESSION."       :rem 238
1450 PRINTSPC(240);CHR$(18);"HIT ANY KEY
     {SPACE}TO BEGIN"                  :rem 87
1460 POKE198,0:WAIT198,1:RETURN        :rem 128
```

BEFORE TYPING...

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Program 2: Therapy—VIC Version

```
100 PRINTCHR$(142)CHR$(8)CHR$(30):POKE368
    79,8:GOSUB1230:POKE198,0           :rem 11
105 Q=0:QD=0                           :rem 144
110 PRINTCHR$(147);"HELLO. I'M DR. ROM.
    {3 SPACES}WHAT'S YOUR NAME?"       :rem 40
115 GOSUB1160:A$=P1$:PRINT             :rem 39
120 PRINT"IN ONE WORD, ";A$;",":PRINT"WHA
    T IS YOUR PROBLEM?":GOSUB1160:B$=P1$
                                       :rem 14
130 PRINT:PRINTB$;"...?":PRINT:PRINT"CAN
    {SPACE}YOU TELL ME MORE?"          :rem 108
140 GOSUB1160:GOSUB900                 :rem 48
150 PRINT:PRINT"I UNDERSTAND ";B$:PRINT"I
    S DIFFICULT FOR YOU."              :rem 99
160 GOSUB1160:IFP1$="NO"THENPRINT"MAYBE I
    'M NOT QUITE{3 SPACES}UNDERSTANDING..
    ."                                 :rem 111
170 PRINT:PRINT"CAN YOU BE MORE{7 SPACES}
    SPECIFIC? HOW IS":PRINTB$;" A PROBLEM
    ?"                                 :rem 5
180 GOSUB1160:GOSUB900                 :rem 52
190 PRINT:PRINT"HOW DOES THIS MAKE YOUFEE
    L, ";A$;"?":GOSUB1160:C$=P1$       :rem 73
200 PRINTCHR$(147)                     :rem 13
205 PRINT"SO WHAT YOU'RE SAYING,";A$;", I
    S THAT YOUR":PRINT"PROBLEM WITH ";B$
                                       :rem 80
210 PRINT"IS MAKING YOU FEEL ":PRINTC$;".
    ":GOSUB1160                        :rem 45
220 PRINT:PRINT"CAN YOU ELABORATE ON
    {2 SPACES}YOUR FEELINGS?":GOSUB1160:G
    OSUB900                            :rem 215
230 PRINT:PRINT"HAS THIS BEEN A{7 SPACES}
    PROBLEM FOR YOU BEFORE? (YES OR NO)":
    GOSUB1160                          :rem 133
240 IFP1$<>"NO"THEN260                 :rem 236
250 PRINT"I SEE. THEN THIS NEW{2 SPACES}S
    ITUATION MUST BE{5 SPACES}DIFFICULT F
    OR YOU.":GOTO320                   :rem 81
260 PRINT:PRINT"DID YOU ALSO FEEL":PRINTC
    $;" THEN?"                         :rem 100
270 GOSUB1160:PRINT"TELL ME MORE.":rem 16
280 GOSUB1160:GOSUB900                 :rem 53
290 PRINTCHR$(147)"I THINK WE HAVE
    {7 SPACES}SOMETHING HERE. DO
    {4 SPACES}YOU SEE A PATTERN?":rem 236
300 GOSUB1160:PRINT:PRINT"GO ON..."
                                       :rem 106
310 GOSUB1160:PRINT"THIS SOUNDS DIFFICULT
     FOR YOU.":GOSUB1160               :rem 41
320 PRINT:PRINT"DO YOU HAVE A PLAN TO DEA
    L WITH THIS CURRENTSITUATION?";
                                       :rem 215
330 PRINT" (YES OR NO)":GOSUB1160:rem 105
340 IFP1$<>"YES"THEN350                :rem 65
```

```
343 PRINT"DO YOU THINK THIS PLANWILL BE S
    UCCESSFUL?":GOTO360          :rem 230
350 PRINT:PRINT"WHY DON'T YOU MAKE A
    {2 SPACES}LIST OF POSSIBLE{6 SPACES}S
    OLUTIONS, THEN."             :rem 107
360 GOSUB1160:GOSUB900           :rem 52
370 FORT=1TO500:NEXTT:PRINTCHR$(147)
                                 :rem 253
380 PRINT"OKAY, WHAT SINGLE WORDBEST DESC
    RIBES";                      :rem 251
385 PRINT" HOW YOUARE FEELING RIGHT NOW?"
                                 :rem 223
390 GOSUB1160:D$=P1$::PRINT:PRINTD$;"...?
    "                            :rem 224
400 GOSUB1160:GOSUB900:PRINT     :rem 246
410 PRINT"I'M THINKING OF DOING SOMETHING
     HERE.":PRINT"LET'S TRY SOME WORD"
                                 :rem 94
430 PRINT"ASSOCIATION AND SEE{3 SPACES}WH
    ERE IT LEADS US."            :rem 172
440 PRINT"WHAT DO YOU THINK{5 SPACES}(YES
     OR NO)?":GOSUB1160          :rem 236
450 IFP1$="YES"THEN490           :rem 11
460 PRINT:PRINT"YOU SEEM TO BE HAVING SOM
    E PROBLEMS WITH{4 SPACES}THIS."
                                 :rem 122
470 PRINT"CAN YOU TELL ME ABOUT IT?":GOSU
    B1160:IFP1$="NO"THEN840      :rem 46
480 PRINT:PRINT"I REALLY THINK A WORD ASS
    OCIATION WOULD BE{2 SPACES}USEFUL RIG
    HT NOW."                     :rem 4
490 PRINT:PRINT"LET'S DO IT."    :rem 242
500 PRINT"I'LL SAY A WORD. YOU{2 SPACES}S
    AY THE FIRST WORD{4 SPACES}THAT COMES
     TO YOUR{4 SPACES}MIND."     :rem 133
510 REM ***WORD ASSOCIATION***   :rem 239
520 FORT=1TO5000:NEXTT:PRINTCHR$(147);"DO
    G":PRINT:GOSUB1160           :rem 204
530 PRINT:PRINT"DRINK":PRINT:GOSUB1160
                                 :rem 241
540 PRINT:PRINT"HOME":PRINT:GOSUB1160:E$=
    P1$                          :rem 40
550 PRINT:PRINTB$:PRINT:GOSUB1160:F$=P1$
                                 :rem 35
560 PRINT:PRINT"FEELINGS":PRINT:GOSUB1160
                                 :rem 201
570 PRINT:PRINT"FUN":PRINT:GOSUB1160:G$=P
    1$                           :rem 237
580 PRINT:PRINT"MOM":PRINT:GOSUB1160:I$=P
    1$                           :rem 240
590 PRINT:PRINTC$:PRINT:GOSUB1160:J$=P1$
                                 :rem 44
600 FORT=1TO1000:NEXTT:PRINTCHR$(147)
                                 :rem 37
610 PRINT"I NOTICED WHEN I SAID HOME THAT
     YOU SAID":PRINTE$;"."       :rem 168
620 PRINT"DOES THIS SOMEHOW{5 SPACES}REFL
    ECT HOW YOU FEEL{2 SPACES}ABOUT YOURS
    ELF?"                        :rem 45
630 PRINT"YES OR NO":GOSUB1160:IFP1$<>"YE
    S"THEN650                    :rem 2
640 PRINT:PRINT"IN WHAT WAY?":GOSUB1160:G
    OSUB900                      :rem 2
650 PRINT:PRINT"HOW DOES THIS RELATE
    {2 SPACES}TO YOUR PROBLEM WITH":PRINT
    B$                           :rem 173
660 GOSUB1160:GOSUB900:PRINT:PRINT"WHEN I
     SAID ";B$:PRINT"YOU SAID ";F$:rem 20
670 PRINT"WHAT DO YOU THINK THISMEANS?":G
    OSUB1160:GOSUB900            :rem 112
680 PRINT:PRINT"ARE YOU DISTRESSED? DOYOU
    WANT A KLEENEX?":GOSUB1160   :rem 28
690 IFP1$<>"YES"THEN710          :rem 73
700 PRINT"HERE.":FORT=1TO1000:NEXTT
                                 :rem 206
710 PRINT:PRINT"IT'S INTERESTING THAT WHE
    N I SAID FUN,{2 SPACES}YOU SAID ";G$
                                 :rem 57
720 GOSUB1160:GOSUB900:PRINTCHR$(147);"HM
    MMM..."                      :rem 110
730 PRINT:PRINT"IT SEEMS TO ME, ";A$;","
                                 :rem 248
735 PRINT"THAT THIS ALL TIES IN TO YOUR P
    ROBLEM"                      :rem 129
740 PRINT"WITH ";B$              :rem 73
750 GOSUB1160:GOTO770            :rem 245
760 REM ***DREAMS***             :rem 57
770 PRINT:PRINT"LET'S TRY A DIFFERENT":PR
    INT"APPROACH,";A$            :rem 145
780 PRINT"TELL ME ABOUT ONE OF{2 SPACES}Y
    OUR DREAMS.":GOSUB1160:GOSUB1040:IFQD
    =1THEN840                    :rem 246
790 PRINT:PRINT"HOW WOULD YOU DESCRIBEYOU
    R FEELINGS IN THE{2 SPACES}DREAM?":GO
    SUB1160                      :rem 45
800 PRINT:PRINT"DID THE DREAM HAVE
    {4 SPACES}ANYTHING TO DO WITH":PRINTI
    $                            :rem 119
810 GOSUB1160:FORT=1TO1000:NEXTT :rem 245
820 REM ***ALL DONE***           :rem 121
830 PRINT:PRINT"{CLR}I THINK WE'RE MOVING
    {2 SPACES}IN A GOOD DIRECTION.":PRINT
                                 :rem 78

840 PRINT"WE'VE DISCUSSED YOUR{2 SPACES}P
    ROBLEM WITH":PRINTB$:PRINT"AND HOW TH
    IS MAKES YOU"                :rem 173
850 PRINT"FEEL ";C$;";"          :rem 230
860 PRINT"AND DISCUSSED SOME{4 SPACES}POS
    SIBLE SOLUTIONS."            :rem 124
870 PRINT:PRINT"I SEE YOUR TIME IS UP.SEE
     YOU NEXT WEEK."             :rem 189
880 END                          :rem 119
890 REM ***KEYWORDS***           :rem 249
900 IFQ>0THENRETURN              :rem 246
910 FORJ=1TOLEN(P1$)-5           :rem 19
920 IFMID$(P1$,J,5)<>" FUN "THEN930
                                 :rem 103

925 PRINT:PRINT"WHAT ARE YOUR{9 SPACES}FE
    ELINGS ABOUT FUN?":GOTO950   :rem 148
930 NEXTJ                        :rem 37
940 RETURN                       :rem 125
950 GOSUB1160:Q=1:PRINT:PRINT"THESE FEELI
    NGS SEEM{3 SPACES}IMPORTANT.":rem 141
960 GOSUB1160:RETURN             :rem 1
1040 REM ***DREAM KEYWORD SEARCH***
                                 :rem 233
1050 FORJ=1TOLEN(P1$)-7          :rem 65
1060 IFMID$(P1$,J,7)=" DON'T "THEN1120
                                 :rem 243
1070 NEXTJ                       :rem 81
1080 FORJ=1TOLEN(P1$)-6          :rem 67
1090 IFMID$(P1$,J,6)=" DONT "THEN1120
                                 :rem 206
1100 NEXTJ                       :rem 75
1110 RETURN                      :rem 163
1120 PRINTCHR$(147)"WHY DO YOU SUPPOSE TH
     AT IS?":GOSUB1160:GOSUB900  :rem 27
1130 PRINT"THIS MAY BE SOMETHING THAT WE'
     LL WANT"                    :rem 176
1140 PRINT"TO DISCUSS LATER. WE MAY FIND
     {SPACE}THAT IT"             :rem 112
```

```
1150 PRINT"RELATES TO YOUR PROBLEM WITH "
     ;B$:QD=1:RETURN              :rem 223
1160 REM ***COMMODORE PUNCTUATION INPUT**
     *                            :rem 55
1170 P1$=""                       :rem 239
1180 GETP2$:IFP2$=""THEN1180      :rem 57
1190 PRINTP2$;                    :rem 57
1200 IFP2$=CHR$(13)THENRETURN     :rem 250
1210 P1$=P1$+P2$                  :rem 28
1220 GOTO1180                     :rem 200
1230 REM ***INTRODUCTION***       :rem 72
1240 PRINTCHR$(147);TAB(6)"THERAPY"
                                  :rem 60
1250 PRINT:PRINT"WOULD YOU LIKE AN
     {5 SPACES}INTRODUCTION (Y/N)"
                                  :rem 101
1260 GETQ$:IFQ$<>"Y"ANDQ$<>"N"THEN1260
                                  :rem 191
1270 IFQ$="N"THENRETURN           :rem 172
1280 PRINTCHR$(147);"WELCOME TO YOUR
     {7 SPACES}THERAPY SESSION.{6 SPACES}
     DR. ROM";                    :rem 31
1285 PRINT" WILL BE WITH{2 SPACES}YOU IN
     {SPACE}A ";                  :rem 172
1290 PRINT"MOMENT. WHILEYOU ARE WAITING,
     {SPACE}HERE ARE SOME HELPFUL"
                                  :rem 104
1300 PRINT"SUGGESTIONS ON HOW TO GET THE
     {SPACE}MOST OUT OF{3 SPACES}YOUR THE
     RAPY SESSION."               :rem 109
1305 PRINT:PRINT                  :rem 29
1310 PRINT"AS WITH MOST THINGS INLIFE, WI
     TH THERAPY,{3 SPACES}THE MORE YOU ";
                                  :rem 42
1320 PRINT"PUT IN,{2 SPACES}THE MORE
     {2 SPACES}YOU GET OUT.YOU MAY FIND I
     T FUN TOTRY AND TRIP ";      :rem 228
1330 PRINT"UP THE{3 SPACES}DOCTOR; MAKE F
     UN OF{3 SPACES}HIS GRAMMAR, OR INSUL
     THIM MERCILESSLY."           :rem 175
1332 PRINT:PRINTCHR$(18)"HIT ANY KEY"
                                  :rem 210
1335 POKE198,0:WAIT198,1          :rem 103
1340 PRINT"{CLR}{DOWN}HOWEVER, EVEN THOUG
     H{2 SPACES}THIS IS A PARLOR
     {6 SPACES}GAME, YOU MAY STILL
     {3 SPACES}FIND ";            :rem 121
1350 PRINT"YOURSELF HAVING{2 SPACES}INTER
     ESTING, AND EVEN IMPORTANT,";
                                  :rem 110
1360 PRINT" INSIGHTS.{2 SPACES}THIS WILL
     {SPACE}ONLY HAPPEN IF YOU{2 SPACES}T
     RY YOUR BEST TO UTILIZE ";   :rem 172
1370 PRINT"THIS{7 SPACES}SESSION AS AN
     {9 SPACES}ENJOYABLE WAY TO MULL OVER
      THE ";                      :rem 218
1380 PRINT"PROBLEMS AND PEEVES OF LIFE."
                                  :rem 127
1390 PRINT:PRINTCHR$(18)"HIT ANY KEY"
                                  :rem 214
1400 POKE198,0:WAIT198,1          :rem 96
1410 PRINTCHR$(147):PRINT"I SEE THE DOCTO
     R IS IN NOW."                :rem 115
1420 PRINT:PRINT"TO TALK TO DR. ROM,
     {3 SPACES}JUST TYPE IN YOUR" :rem 29
1430 PRINT"RESPONSE; AND HIT ";CHR$(18):P
     RINT"RETURN";CHR$(146);" WHEN YOU AR
     E"                           :rem 138
1440 PRINT"FINISHED.":PRINT:PRINT:PRINT"E
     NJOY YOUR THERAPY SESSION." :rem 238
1450 PRINT:PRINTCHR$(18);" HIT ANY KEY TO
     BEGIN"                       :rem 22
1460 POKE198,0:WAIT198,1:RETURN   :rem 128
```

Spelling Critter

See article on page 82.

BEFORE TYPING...

Before typing in programs, please refer to "How To Type COMPUTE!'s Gazette Programs," "A Beginner's Guide To Typing In Programs," and "The Automatic Proofreader" that appear before the Program Listings.

Program 1:

Spelling Critter—VIC Version

```
2 PRINT"{CLR}{4 DOWN}{2 RIGHT}SPELLING CR
  ITTER"                          :rem 143
15 PRINT"{10 DOWN}{2 RIGHT}ONE MOMENT PLE
   ASE"                           :rem 135
20 POKE36869,255                  :rem 105
21 POKE52,28:POKE56,28:CLR        :rem 20
22 FORI=7168TO7679:POKEI,PEEK(I+25600):NE
   XT                             :rem 101
23 FORC=7168TO7175:READA:POKEC,A:NEXT
                                  :rem 66
24 FORC=7664TO7671:READA:POKEC,A:NEXT
                                  :rem 69
25 FORC=7656TO7663:READA:POKEC,A:NEXT
                                  :rem 72
30 DATA96,128,77,63,31,13,0,0     :rem 186
31 DATA3,52,184,240,240,184,52,3  :rem 76
32 DATA0,54,58,242,242,58,54,0    :rem 239
50 DIMW$(50)                      :rem 112
60 PRINT"{CLR}"                   :rem 202
61 POKE36878,15                   :rem 56
70 PRINT"HI,WHAT IS YOUR"         :rem 20
75 INPUT"NAME";N$                 :rem 14
80 GOSUB5000                      :rem 173
90 W=0:R=0:Z=0                    :rem 39
100 FORB=1TON                     :rem 25
120 PRINT"{CLR}{2 DOWN}{5 RIGHT}"W$(B)
                                  :rem 184
140 FORT=1TO1000:NEXT             :rem 27
160 PRINT"{CLR}":A$=""            :rem 27
165 PRINT"{RED}{RVS}{2 SPACES}TO REVIEW T
    HE WORD{2 SPACES}"            :rem 45
166 PRINT"{RVS}{2 SPACES}TYPE ? AND RETUR
    N{3 SPACES}{BLU}"             :rem 211
180 PRINT"{3 DOWN}HOW DO YOU SPELL":PRINT
                                  :rem 98
190 INPUT"THAT WORD";A$           :rem 123
195 IFA$=""ORLEN(A$)=0THEN160     :rem 125
200 IFA$="THAT WORD"THENGOSUB6000:GOTO160
                                  :rem 243
210 IFA$="?"ORA$="/"THEN120       :rem 191
220 IFA$=W$(B)THENGOSUB7000:GOTO400
                                  :rem 80
230 GOSUB8000                     :rem 221
240 PRINT"{CLR}{5 DOWN}I'M SORRY,"N$:PRIN
    T                             :rem 16
260 PRINT"THAT IS WRONG":PRINT    :rem 138
270 POKE36874,223                 :rem 151
274 FORT=1TO500:NEXT              :rem 247
275 POKE36874,0                   :rem 53
280 PRINT"THE CORRECT WAY IS:"    :rem 37
```

```
300 PRINT"{3 DOWN}{5 RIGHT}{BLK}"W$(B)"
    {BLU}"                          :rem 41
320 W=W+1                           :rem 220
340 GOTO450                         :rem 105
400 PRINT"{2 DOWN}THAT IS RIGHT"    :rem 210
420 PRINT"{RED}{DOWN}VERY GOOD{BLU} ";N$
                                    :rem 207
424 M=220                           :rem 184
425 FORP=1TO8                       :rem 27
427 M=M+3                           :rem 210
429 POKE36876,M                     :rem 85
430 FORT=1TO25                      :rem 74
431 POKE36876,0                     :rem 49
432 NEXTP                           :rem 40
433 RESTORE                         :rem 190
440 R=R+1                           :rem 213
450 POKE198,0:PRINT"{3 DOWN}HIT ANY KEY"
                                    :rem 186
460 GETZ$:IFZ$=""THEN460            :rem 137
480 NEXTB                           :rem 29
500 PRINT"{CLR}YOU HAD{RED} "R" {BLU}RIGH
    T AND{RED} ":PRINT              :rem 200
510 PRINTW" {BLU}WRONG."            :rem 152
550 PRINT"{3 DOWN}WOULD YOU LIKE TO":PRIN
    T                               :rem 181
560 PRINT"TRY AGAIN (Y/N)?"         :rem 49
580 GETZ$:IFZ$=""OR(Z$<>"Y"ANDZ$<>"N")THE
    N580                            :rem 115
590 IFZ$="Y"THEN80                  :rem 28
600 PRINT"{CLR}IT HAS BEEN VERY NICE":PRI
    NT:PRINT"SPELLING WITH YOU":PRINT
                                    :rem 34
620 PRINTN$"."                      :rem 9
640 PRINT"{3 DOWN}PLEASE COME BACK AGAIN"
    :PRINT                          :rem 180
650 PRINT"TO PLAY REAL SOON."       :rem 214
660 PRINT"{2 DOWN}{9 RIGHT}{RED}BYE!"
                                    :rem 177
700 END                             :rem 110
5000 REM INPUT                      :rem 57
5050 PRINT"{CLR}{DOWN}HOW MANY WORDS DO W
    E"                              :rem 32
5060 INPUT"HAVE TODAY";Z$:N=VAL(Z$):IFN>5
    0ORN=0THEN5050                  :rem 131
5100 FORX=1TON                      :rem 100
5150 PRINT"{CLR}{RED}{RVS}{SHIFT-SPACE}CH
    ECK YOUR SPELLING!!{OFF}{BLU}"
                                    :rem 251
5200 PRINT"{3 DOWN}WORD #";X;:INPUT"
    {LEFT}";W$(X)                   :rem 2
5210 IFLEN(W$(X))=0ORLEN(W$(X))>10THEN515
    0                               :rem 166
5220 IFASC(W$(X))<65ORASC(W$(X))>90THEN51
    50                              :rem 217
5250 NEXTX                          :rem 99
5300 RETURN                         :rem 168
6000 REM WISEGUY                    :rem 215
6010 PRINT"{RED}{2 DOWN}VERY FUNNY,WISEGU
    Y{BLU}":PRINT                   :rem 235
6015 FORT=1TO1000:NEXT              :rem 82
6020 FORT=1TO500:NEXT               :rem 34
6030 RETURN                         :rem 169
7000 Q=0                            :rem 133
7001 L=7900:CO=38620                :rem 45
7010 POKEL+Q,0:POKECO+Q,4           :rem 242
7020 POKEL+Q+1,61:POKECO+Q+1,4      :rem 226
7030 FORT=1TO50:NEXT                :rem 244
7040 POKEL+Q+1,62:POKECO+Q+1,4      :rem 229
7042 POKE36877,160:FORT=1TO10:NEXT:rem 46
7045 POKE36877,0                    :rem 106
7050 FORT=1TO50:NEXT                :rem 246
7060 IFQ=9THENRETURN                :rem 50
7070 POKEL+Q,32                     :rem 86
7075 Q=Q+1                          :rem 14
7080 GOTO7001                       :rem 208
8000 Q=0                            :rem 134
8001 L=7900:CO=38620                :rem 46
8010 POKEL+Q,0:POKECO+Q,4           :rem 243
8020 POKEL+Q+1,61:POKEL+Q+1,4       :rem 157
8030 FORT=1TO50:NEXT                :rem 245
8040 POKEL+Q+1,62:POKECO+Q+1,4      :rem 230
8042 POKE36877,160:FORT=1TO10:NEXT:rem 47
8045 POKE36877,0                    :rem 107
8050 FORT=1TO50:NEXT                :rem 247
8060 POKEL+Q,32                     :rem 86
8070 IFQ=20THENPOKEL+Q+1,32:RETURN
                                    :rem 123
8075 Q=Q+1                          :rem 15
8080 GOTO8001                       :rem 210
9000 END                            :rem 160
```

Program 2:

Spelling Critter—64 Version

```
10 POKE52,48:POKE56,48:CLR          :rem 22
20 POKE53281,1:PRINT"{CLR}":POKE53281,6:P
   OKE53280,6                       :rem 42
30 S=54272:V=54296:AD=54277:SR=5427F=5
   4273:LF=S:SD=54276               :rem 117
40 FORL=STOS+24:POKEL,0:NEXT:POKEAD,14:PO
   KESR,204                         :rem 135
50 FORI=1436TO1443:POKEI,INT(RND(1)*25)+1
   :NEXT:FORI=1445TO1451            :rem 216
60 POKEI,INT(RND(1)*25)+1:NEXT:FORI=1 TO
   {SPACE}500:NEXT                  :rem 155
70 FORI=1436TO1443:READL:POKEI,L+128:GOSU
   B110:FORJ=1TO70:NEXTJ:POKESD,32:NEXTI
                                    :rem 232
80 FORI=1445TO1451:READL:POKEI,L+128:GOSU
   B110:FORJ=1TO70:NEXTJ:POKESD,32:NEXTI
                                    :rem 232
90 DATA19,16,5,12,12,9,14,7,3,18,9,20,20,
   5,18                             :rem 195
100 POKE1444,160:GOTO 120           :rem 86
110 POKEV,15:POKEHF,40:POKELF,50:POKESD,3
    3:POKEV,0:RETURN                :rem 131
120 PRINT"{HOME}{WHT}{15 DOWN}{3 RIGHT}ON
    E MOMENT.....PLEASE!"
                                    :rem 63
130 PRINTCHR$(142):POKE56334,PEEK(56334)A
    ND254                           :rem 141
140 POKE1,PEEK(1)AND251:FORI=0TO511:POKEI
    +12288,PEEK(I+53248):NEXT       :rem 187
150 POKE1,PEEK(1)OR4:POKE56334,PEEK(56334
    )OR1                            :rem 133
160 FORI=1TO3:READW:FORC=WTOW+7:READA:POK
    EC,A:NEXTC:NEXTI                :rem 58
170 DATA12288,96,128,77,63,31,13,0,0
                                    :rem 32
180 DATA12784,3,52,184,240,240,184,52,3
                                    :rem 179
190 DATA12776,0,54,58,242,242,58,54,0
                                    :rem 87
200 DIMW$(50):CL=54272              :rem 167
210 FORJ=1TO7:READM$(J):NEXTJ       :rem 49
220 POKE53272,(PEEK(53272)AND240)OR12
                                    :rem 41
230 POKE53281,1:PRINT"{CLR}":POKE53281,6:
    POKE53280,6                     :rem 93
240 R=1464:J=1:GOSUB450:GOSUB850    :rem 144
250 N$=NM$:POKE53272,21             :rem 0
```

```
260 GOSUB710:POKE53281,1:PRINT"{CLR}":POK
    E53281,6:POKE53280,6          :rem 178
270 WG=0:RT=0                     :rem 241
280 FORB=1TON                     :rem 34
290 PRINT"{CLR}{WHT}":POKE214,12:PRINT:PO
    KE211,INT((40-LEN(W$(B)))/2)-1:PRINTW
    $(B)                          :rem 115
300 FORT=1TO1000:NEXT             :rem 25
310 PRINT"{CLR}{WHT}{5 SPACES}TO REVIEW T
    HE WORD PRESS ? KEY"          :rem 68
320 POKE53272,28:R=1464:J=2:GOSUB450:GOSU
    B850                          :rem 146
330 A$=NM$                        :rem 247
340 IFA$="THAT WORD"THENJ=6:R=1704:GOSUB1
    020:GOSUB450:R=1544:GOSUB790:GOTO290
                                  :rem 201
350 IFASC(A$)=63ORASC(A$)=47THEN290
                                  :rem 250
360 IFA$=W$(B)THENGOSUB1020:J=5:M$(J)=M$(
    J)+" "+N$:R=1704:GOSUB450     :rem 195
370 IFJ=5THENRT=RT+1:GOSUB400:GOSUB570:GO
    TO560                         :rem 171
380 WG=WG+1:GOSUB1020:J=3:M$(J)=M$(J)+" "
    +N$:R=1704:GOSUB450:GOSUB570  :rem 186
390 J=4:R=1824:M$(J)=M$(J)+" "+W$(B):GOSU
    B450:R=1544:GOSUB790:GOSUB570:rem 192
395 M$(J)="THE CORRECT ANSWER IS:":GOTO59
    0                             :rem 216
400 REM CORRECT ANSWER SOUND      :rem 227
410 POKEV,15:POKESD,17:FORS=40TO100
                                  :rem 137
420 POKEHF,INT(RND(1)*100+40):POKELF,S:FO
    RD=1TO20:NEXT                 :rem 54
430 NEXT:POKESD,16:RETURN         :rem 131
440 REM MESSAGE ROUTINE           :rem 167
450 C=((R-1024)/40)-1:CN=INT((40-LEN(M$(J
    )))/2)-1                      :rem 19
460 FORI=1TOLEN(M$(J)):LR=R+CN+I:IFLR>202
    3THENLR=2023                  :rem 235
470 FORK=1TO20:NEXTK:POKELR+1,32  :rem 248
480 POKELR,0:POKELR+1,62:POKELR+CL,1:POKE
    LR+CL+1,1:GOSUB110:POKESD,32  :rem 49
490 FORK=1TO20:NEXTK:POKELR,32    :rem 158
500 A=ASC(MID$(M$(J),I,1)):IFA=32THENPOKE
    LR,A:GOTO530                  :rem 136
510 IFA<65ORA>90THENPOKE214,C:PRINT:POKE2
    11,CN+I:PRINTCHR$(A):GOTO530  :rem 84
520 CH=A-64:POKELR,CH:POKELR+CL,1 :rem 19
530 NEXTI                         :rem 32
540 FORD=LR+1TOR+38:POKED,0:POKED+1,62:PO
    KED+CL,3:POKED+CL+1,3:GOSUB110:rem 96
550 POKESD,32:FORK=1TO10:NEXTK:POKED,32:P
    OKED+1,32:NEXTD:RETURN        :rem 66
560 POKE198,0:PRINT"{2 DOWN}{15 RIGHT}HIT
     ANY KEY":GOTO 580            :rem 110
570 M$(J)=MID$(M$(J),1,LEN(M$(J))-LEN(N$)
    -1):RETURN                    :rem 76
580 GETZ$:IFZ$=""THEN580          :rem 143
590 NEXTB                         :rem 31
600 REM GAME OVER ROUTINE         :rem 246
610 POKE53272,21:PRINT"{CLR}{WHT}{3 DOWN}
    {11 RIGHT}THE GAME IS OVER"   :rem 64
620 PRINT"{3 DOWN}{2 RIGHT}RIGHT";TAB(33)
    ;"WRONG"                      :rem 41
630 PRINT"{DOWN}{2 RIGHT}";RT;TAB(33);WG
                                  :rem 56
640 PRINT"{8 DOWN}{2 SPACES}WOULD YOU LIK
    E TO PLAY AGAIN (Y/N)?"       :rem 63
650 GETZ$:IFZ$=""OR(Z$<>"Y"ANDZ$<>"N")THE
    N650                          :rem 111
660 IFZ$="Y"THENFORI=1TON:W$(I)="":NEXT:G
    OTO260                        :rem 149
670 PRINT"{CLR}{8 DOWN}{3 SPACES}IT HAS B
    EEN VERY NICE SPELLING{10 SPACES}WITH
     YOU ";N$;"."                 :rem 114
680 PRINT"{2 DOWN}{4 SPACES}PLEASE COME B
    ACK TO PLAY AGAIN."           :rem 231
690 POKE53272,28:R=1704:J=7:GOSUB450:POKE
    53272,21:END                  :rem 83
700 REM INPUT                     :rem 11
710 POKE53280,3:POKE53281,3       :rem 243
720 PRINT"{CLR}{BLU}{12 DOWN}HOW MANY WOR
    DS DO WE HAVE TODAY";:INPUTZ$:N=VAL(Z
    $)                            :rem 104
725 IFN>50ORN=0THEN720            :rem 66
730 PRINT"{CLR}{BLU}{3 DOWN}{9 SPACES}
    {RVS}{SHIFT-SPACE}CHECK YOUR SPELLING
    !!{OFF}{BLU}"                 :rem 0
740 FORX=1TON                     :rem 57
750 POKE214,12:PRINT:POKE211,5:PRINT"ENTE
    R WORD # ";X;:INPUT"{LEFT}";W$(X)
                                  :rem 214
760 FORI=1TO17:POKE214,12:PRINT:POKE211,2
    1+I:PRINTCHR$(32):NEXTI       :rem 220
765 IFLEN(W$(X))=0ORLEN(W$(X))>10THEN750
                                  :rem 81
766 IFASC(W$(X))<65ORASC(W$(X))>90THEN750
                                  :rem 132
770 NEXTX:RETURN                  :rem 79
780 REM ERASE ROUTINE             :rem 25
790 FORI=RTOR+38                  :rem 234
800 CH=62:IF(I+1)/2=INT((I+1)/2)THENCH=61
                                  :rem 22
810 POKEI+CL,1:POKEI+CL+1,1       :rem 77
820 POKEI,0:POKEI+1,CH:FORD=1TO50:NEXTD
                                  :rem 203
830 POKEI,32:GOSUB110:POKESD,32:NEXTI:POK
    EI,32:RETURN                  :rem 160
840 REM ANSWER ROUTINE            :rem 118
850 POKE198,0:POKE1561+CL,1:POKE1562+CL,1
    :POKE1561,0:POKE1562,62:CT=1:NM$=""
                                  :rem 123
860 GETZ$:IFZ$=""THEN860          :rem 145
870 IFASC(Z$)=63ORASC(Z$)=47THENNM$=Z$:RE
    TURN                          :rem 44
880 IFASC(Z$)=32THENA=32:GOTO920  :rem 151
890 IFASC(Z$)=13ANDLEN(NM$)<>0THEN950
                                  :rem 176
900 IFASC(Z$)<65ORASC(Z$)>90THEN860
                                  :rem 48
910 A=ASC(Z$)-64                  :rem 85
920 NM$=NM$+Z$:POKE1560+CT,A:POKE1561+CT,
    0:POKE1561+CT+1,62            :rem 159
930 POKE1560+CT+CL,1:POKE1561+CT+CL,1:POK
    E1561+CT+CL+1,1:CT=CT+1       :rem 235
940 GOSUB110:POKESD,32:GOTO860    :rem 81
950 IFJ<>1THENRETURN              :rem 49
960 FORI=1561TO1582:POKEI,32:FORJ=1TOLEN(
    NM$)                          :rem 250
970 A=I+J:IFA>1582THENA=1582:POKEA,32:GOT
    O 990                         :rem 193
975 AS=ASC(MID$(NM$,J,1)):IFAS<65ORAS>90T
    HENPOKEA,32:GOTO990           :rem 164
980 POKEA+CL,1:POKEA,AS-64        :rem 41
990 NEXTJ:A=I+J+1:IFA>1582THENA=1582:POKE
    A,32:GOTO 1010                :rem 2
1000 POKEA-1+CL,1:POKEA+CL,1:POKEA-1,0:PO
     KEA,62                       :rem 9
1010 FORK=1TO30:NEXTK:GOSUB110:POKESD,32:
     NEXTI:RETURN                 :rem 229
1020 FORI=1561+LEN(NM$)TO1581     :rem 137
1030 POKEI+CL,1:POKEI+1+CL,1:POKEI+2+CL,1
```

```
    :POKEI,32:POKEI+1,0:POKEI+2,62
                                    :rem 238
1040 GOSUB1110:POKESD,32:NEXTI:POKEI,32:PO
    KEI+1,32:RETURN                 :rem 38
1050 DATA"HI, WHAT IS YOUR NAME"    :rem 33
1060 DATA"HOW DO YOU SPELL THAT WORD"
                                    :rem 144
1070 DATA"I'M SORRY, THAT IS WRONG":rem 8
1080 DATA"THE CORRECT ANSWER IS:":rem 192
1090 DATA"THAT IS RIGHT, VERY GOOD"
                                    :rem 14
1100 DATA"VERY FUNNY, WISEGUY"      :rem 79
1110 DATA"BYE!{2 SPACES}BYE!{2 SPACES}BYE
    !"                              :rem 36
```

Word Scramble

See article on page 86.

BEFORE TYPING...

Before typing in programs, please refer to "How To Type COMPUTE!'s Gazette Programs," "A Beginner's Guide To Typing In Programs," and "The Automatic Proofreader" that appear before the Program Listings.

Program 1:

Word Scramble—VIC Version

```
10 PRINT"{CLR}":POKE36879,8:PRINT"{RED}
   {7 DOWN}{5 RIGHT}WORD SCRAMBLE":POKE36
   878,15                           :rem 98
20 GOSUB1000:POKE36879,27:PRINT"{CLR}"
                                    :rem 80
25 PRINT"{RED}EACH PLAYER TAKING":PRINT"T
   URNS ENTERS A COMMON"            :rem 114
30 PRINT"{RED}WORD (MAX.10 LETTERS).";
                                    :rem 222
35 PRINT"{RED}THE COMPUTER WILL THEN";:PR
   INT"SCRAMBLE THE WORD AND"       :rem 139
40 PRINT"{RED}PRINT IT."            :rem 169
45 PRINT"{RED}YOU HAVE THREE MINUTES";:PR
   INT"TO FIND IT."                 :rem 233
50 PRINT"{RED}IF FOUND WITHIN THE":PRINT"
   ALLOTTED TIME,YOU WILL";         :rem 64
55 PRINT"{RED}BE GIVEN 50 POINTS.":PRINT"
   EVERY WRONG GUESS THAT";         :rem 221
60 PRINT"{RED}YOU MAKE WILL COST":PRINT"Y
   OU 10 POINTS.{BLU}"              :rem 114
65 PRINT:PRINT:PRINT:PRINT"{3 RIGHT}{RVS}
   {PUR}PRESS SPACE BAR{OFF}"       :rem 246
70 GETA$:IFA$=""THEN70:C=0          :rem 219
80 PRINT"{CLR}{4 DOWN}{GRN}PLAYER # 1'S N
   AME{BLU}":INPUTP$(0)             :rem 200
85 PRINT:PRINT:PRINT"{RED}PLAYER # 2'S NA
   ME{BLU}":INPUTP$(1)              :rem 132
90 PRINT:PRINT"{DOWN}{PUR}"P$(C)",":PRINT
   "{RVS}{RED}ENTER WORD TO BE":PRINT"
   {RVS}SCRAMBLED:{OFF}{BLU}"       :rem 216
92 W$="":INPUTW$:IFW$=""THENPRINT"{UP}";:
   GOTO92                           :rem 27
95 IFLEN(W$)>10THENPRINT"{RVS}{GRN}MORE T
   HAN 10 LETTERS!{OFF}{BLU}{7 UP}":GOTO9
   0                                :rem 254
100 GOSUB200                        :rem 163
110 GOSUB300                        :rem 165
120 T(C)=T(C)+S(C)                  :rem 178
130 GOSUB400:FORI=1TO10:B$(I)="":NEXT
                                    :rem 184
140 GOTO90                          :rem 55
200 FORI=1TOLEN(W$)                 :rem 126
210 A$(I)=MID$(W$,I,1)              :rem 107
220 NEXT                            :rem 211
230 C$="":FORI=1TOLEN(W$)           :rem 163
240 R=INT(RND(1)*LEN(W$)+1)         :rem 248
250 IFB$(R)<>""THEN240              :rem 178
260 B$(R)=A$(I)                     :rem 221
270 NEXT                            :rem 216
271 FORI=1TOLEN(W$):C$=C$+B$(I):NEXT
                                    :rem 111
272 IFC$=W$ANDLEN(W$)<>1THENFORI=1TOLEN(W
   $):B$(I)="":NEXT:GOTO230         :rem 201
275 PRINT"{CLR}{5 DOWN}{RVS}{7 RIGHT}
   {RED}WORD HAS{11 RIGHT}BEEN SCRAMBLED
   {OFF}{BLU}"                      :rem 255
280 PRINT"{6 DOWN}{3 RIGHT}{GRN}PRESS SPA
   CE BAR{9 RIGHT}WHEN READY{BLU}"
                                    :rem 223
285 GETC$:IFC$=""THEN285            :rem 101
290 PRINT"{CLR}{5 DOWN}{7 RIGHT}";:rem 90
295 FORI=1TOLEN(W$):PRINT"{RED}";B$(I);:N
   EXT                              :rem 162
298 RETURN                          :rem 131
300 X=51:S(C)=50                    :rem 81
310 TI$="000000"                    :rem 246
320 PRINT:PRINT:PRINT:PRINT         :rem 119
325 SC=7885:CC=38605                :rem 76
330 FORI=1TOLEN(W$)                 :rem 130
335 POKESC,99:POKECC,2              :rem 75
340 GETC$                           :rem 222
350 PRINT"{HOME}{RVS}"MID$(TI$,4,1)"
   {OFF}MINUTES{2 SPACES}{RVS}"RIGHT$(TI
   $,2)" {OFF}SECONDS"              :rem 95
355 IFTI$="000300"THENGOSUB500:GOTO390
                                    :rem 228
360 IFC$=""THEN340                  :rem 214
365 PRINT"{4 DOWN}"                 :rem 179
370 IFC$=A$(I)THENPRINTTAB(X)A$(I);:POKE3
   6875,200:FORT=1TO100:NEXT:POKE36875,0
   :GOTO380                         :rem 230
375 IFS(C)<10THENGOSUB550:GOTO390 :rem 10
378 IFC$<>A$(I)THENS(C)=S(C)-10:POKE36877
   ,220:FORT=1TO100:NEXT:POKE36877,0:GOT
   O335                             :rem 131
380 X=X+1:SC=SC+1:CC=CC+1:NEXT      :rem 59
390 RETURN                          :rem 124
400 IFC<>1THENC=1:RETURN            :rem 11
410 PRINT"{CLR}{5 DOWN}{7 RIGHT}{RED}
   {RVS}SCORES{OFF}{BLU}"           :rem 199
420 PRINT"{7 RIGHT}[6 T]"           :rem 4
430 PRINT"{DOWN}"P$(0),P$(1)        :rem 144
440 PRINTT(1),T(0)                  :rem 252
450 C=0:RETURN                      :rem 99
500 PRINT"{CLR}{4 DOWN}{3 RIGHT}{RVS}
   {RED}YOUR TIME IS UP.{OFF}{BLU}"
                                    :rem 96
510 PRINT"{2 DOWN}{2 RIGHT}WORD WAS:"W$".
   ":S(C)=0                         :rem 159
520 FORT=1TO5000:NEXT:RETURN        :rem 59
550 PRINT"{RVS}{RED}{2 DOWN}YOU RAN OUT O
   F POINTS.{OFF}{BLU}"             :rem 226
560 PRINT"{2 DOWN}{PUR}WORD WAS:{BLU}"W$"
   ."                               :rem 151
570 FORT=1TO2000:NEXT               :rem 35
580 RETURN                          :rem 125
1000 FORS=250TO235STEP-1:POKE36874,S:POKE
     36878,S-235:FORT=1TO100:NEXTT,S
                                    :rem 188
1010 POKE36874,0:POKE36878,15:RETURN
                                    :rem 126
```

Program 2:
Word Scramble—64 Version

```
1 POKE53280,6:POKE53281,1                :rem 141
5 SN=54272                               :rem 23
6 POKESN+24,15:POKESN+5,17:POKESN+6,240:P
  OKESN,100                              :rem 27
10 PRINT"{CLR}":PRINT"{RED}{9 DOWN}
   {13 RIGHT}WORD SCRAMBLE"              :rem 131
20 GOSUB1000:PRINT"{CLR}"                :rem 65
25 PRINT"{RED}{2 DOWN}EACH PLAYER TAKES A
    TURN ENTERING A{5 SPACES}COMMON ";
                                         :rem 247
30 PRINT"WORD (A MAXIMUM OF 10 LETTERS)."
                                         :rem 103
35 PRINT"{DOWN}THE COMPUTER WILL THEN SCR
   AMBLE THE WORD";                      :rem 162
40 PRINT"AND PRINT IT."                  :rem 96
45 PRINT"{DOWN}YOU HAVE THREE MINUTES TO
   {SPACE}FIND IT."                      :rem 152
50 PRINT"{DOWN}IF FOUND WITHIN THE ALLOTT
   ED TIME, YOU"                         :rem 183
55 PRINT"WILL BE GIVEN 50 POINTS."
                                         :rem 227
60 PRINT"{DOWN}FOR EVERY WRONG GUESS THAT
    YOU MAKE, YOUWILL LOSE 10 POINTS.
   {BLU}"                                :rem 57
65 PRINT"{3 DOWN}{7 RIGHT}{RVS}{PUR}PRESS
    SPACE BAR WHEN READY{OFF}"           :rem 239
70 IFPEEK(197)<>60THEN70                 :rem 131
75 POKE198,0                             :rem 153
80 PRINT"{CLR}{4 DOWN}{GRN}PLAYER # 1'S N
   AME{BLU}":INPUTP$(0)                  :rem 200
85 PRINT"{3 DOWN}{PUR}PLAYER # 2'S NAME
   {BLU}":INPUTP$(1)                     :rem 169
90 PRINT"{HOME}{16 DOWN}{RED}";P$(C);" EN
   TER WORD TO BE SCRAMBLED:{OFF}{BLU}"
                                         :rem 151
92 W$="":INPUTW$:IFW$=""THENPRINT"{UP}";:
   GOTO92                                :rem 27
95 IFLEN(W$)>10THENPRINT"{RVS}{GRN}NO MOR
   E THAN 10 LETTERS{OFF}{BLU}":GOTO90
                                        :rem 131
100 GOSUB200                            :rem 163
110 GOSUB300                            :rem 165
120 T(C)=T(C)+S(C)                      :rem 178
130 GOSUB400:FORI=1TO10:B$(I)="":NEXT
                                        :rem 184
140 GOTO90                               :rem 55
200 FORI=1TOLEN(W$)                     :rem 126
210 A$(I)=MID$(W$,I,1)                  :rem 107
220 NEXT                                :rem 211
230 C$="":FORI=1TOLEN(W$)               :rem 163
240 R=INT(RND(1)*LEN(W$)+1)             :rem 248
250 IFB$(R)<>""THEN240                  :rem 178
260 B$(R)=A$(I)                         :rem 221
270 NEXT                                :rem 216
271 FORI=1TOLEN(W$):C$=C$+B$(I):NEXT
                                        :rem 111
272 IFC$=W$ANDLEN(W$)<>1THENFORI=1TOLEN(W
    $):B$(I)="":NEXT:GOTO230            :rem 201
275 PRINT"{CLR}{5 DOWN}{8 SPACES}{RVS}
    {RED}WORD HAS BEEN SCRAMBLED.{OFF}
    {BLU}"                              :rem 35
280 POKE 198,0:PRINT"{6 DOWN}{7 SPACES}
    {GRN}PRESS SPACE BAR WHEN READY{BLU}"
                                        :rem 234
285 IFPEEK(197)<>60THEN285              :rem 243
290 PRINT"{CLR}{5 DOWN}{15 RIGHT}";
                                        :rem 66
295 FORI=1TOLEN(W$):PRINT"{RED}";B$(I);:N
    EXT                                 :rem 162
298 POKE198,0:RETURN                    :rem 234
300 X=95:S(C)=50                         :rem 89
310 TI$="000000"                        :rem 246
320 PRINT:PRINT:PRINT:PRINT             :rem 119
325 SC=1399:CC=SC+54272                   :rem 5
330 FORI=1TOLEN(W$)                     :rem 130
335 POKESC,99:POKECC,2                   :rem 75
340 GETC$                               :rem 222
350 PRINT"{HOME}{RVS}{9 RIGHT}"MID$(TI$,4
    ,1)" {OFF}MINUTES{2 SACES}{RVS}"RIGH
    T$(TI$,2)" {OFF}SECONDS"            :rem 100
355 IFTI$="000300"THENGOSUB500:GOTO390
                                        :rem 228
360 IFC$=""THEN340                      :rem 214
365 PRINT"{4 DOWN}"                     :rem 179
370 IFC$=A$(I)THENPRINTTAB(X)A$(I);:BY=50
    :LN=50:GOSUB600:GOTO380             :rem 141
375 IFS(C)<10THENGOSUB550:GOTO390 :rem 10
378 IFC$<>A$(I)THENS(C)=S(C)-10:BY=20:LN=
    120:GOSUB600:GOTO335                :rem 79
380 X=X+1:SC=SC+1:CC=CC+1:NEXT           :rem 59
390 RETURN                              :rem 124
400 IFC<>1THENC=1:RETURN                 :rem 11
410 PRINT"{CLR}{5 DOWN}{17 RIGHT}{RED}
    {RVS}SCORES{OFF}{BLU}"              :rem 233
420 PRINT"{17 RIGHT}[6 T]"             :rem 38
430 PRINT"{DOWN}{10 RIGHT}"P$(0);TAB(25);
    P$(1)                               :rem 139
440 PRINT"{9 RIGHT}"T(1);TAB(24);T(0)
                                        :rem 29
450 C=0:RETURN                           :rem 99
500 PRINT"{CLR}{4 DOWN}{12 RIGHT}{RVS}
    {RED}YOUR TIME IS UP{OFF}{BLU}"
                                        :rem 55
510 PRINT"{2 DOWN}{10 RIGHT}WORD WAS "W$"
    .":S(C)=0                           :rem 77
520 FORT=1TO5000:NEXT:RETURN            :rem 59
550 PRINT"{RVS}{RED}{2 DOWN}{9 RIGHT}YOU
    {SPACE}RAN OUT OF POINTS{OFF}{BLU}"
                                        :rem 185
560 PRINT"{2 DOWN}{PUR}{10 RIGHT}WORD WAS
     {BLU}"W$"."                        :rem 127
570 FORT=1TO2000:NEXT                    :rem 35
580 RETURN                              :rem 125
600 POKESN+1,BY:POKESN+4,33:FORQQ=1TOLN:N
    EXT:POKESN+4,32:RETURN              :rem 127
1000 FORBY=50TO20STEP-1:LN=20:GOSUB600:NE
     XT:FORI=1TO500:NEXT                 :rem 73
1010 RETURN                             :rem 162
```

The Beginner's Corner

See article on page 88.

Program 1: Tic-Tac-Toe (64 Version)

```
100 REM TIC-TAC-TOE                     :rem 111
110 GOTO 560                            :rem 102
120 REM X                               :rem 207
130 POKE M,A:POKE M+4,A:POKE M+41,A
                                        :rem 178
140 POKE M+43,A:POKE M+82,A:POKE M+121,A
                                        :rem 170
150 POKE M+123,A:POKE M+160,A:POKE M+164,
    A                                    :rem 14
160 RETURN                              :rem 119
170 REM O                               :rem 203
```

```
180 POKE M,233:POKE M+4,223:POKE M+160,95
    :POKE M+164,105                    :rem 1
190 FOR I=1 TO 3                       :rem 14
200 POKE M+I,A:POKE M+I+160,A          :rem 72
210 POKE M+40*I,A:POKE M+40*I+4,A      :rem 2
220 NEXT I                             :rem 28
230 POKE M+82,32                       :rem 55
240 RETURN                             :rem 118
250 FOR I=M+C TO M+C+160 STEP 40       :rem 127
260 POKE I,CC(N):POKE I+1,CC(N):POKE I+2,
    CC(N):POKE I+3,CC(N):POKE I+4,CC(N)
                                       :rem 227
270 NEXT I                             :rem 33
280 RETURN                             :rem 122
290 REM TONE                           :rem 181
300 POKE F1,42:POKE F2,62              :rem 64
310 POKE W,17                          :rem 174
320 FOR D=1 TO 60:NEXT D:POKE W,0      :rem 16
330 RETURN                             :rem 118
340 X=N:P(E)=X:M=S(E):ON X GOSUB 130,130,
    180                                :rem 164
350 GOSUB 250                          :rem 175
360 FOR I=1 TO 7 STEP 3                :rem 128
370 IF P(I)<>P(I+1) THEN 400           :rem 150
380 IF P(I)<>P(I+2) THEN 400           :rem 152
390 ON P(I)+1 GOTO 400,1550,1550,1550
                                       :rem 49
400 NEXT I                             :rem 28
410 FOR I=1 TO 3                       :rem 9
420 IF P(I)<>P(I+3) THEN 450           :rem 153
430 IF P(I)<>P(I+6) THEN 450           :rem 157
440 ON P(I)+1 GOTO 450,1550,1550,1550
                                       :rem 50
450 NEXT I                             :rem 33
460 IF P(5)<>X THEN 490                :rem 157
470 IF (P(1)=X) AND (P(9)=X) THEN 1550
                                       :rem 111
480 IF (P(3)=X) AND (P(7)=X) THEN 1550
                                       :rem 112
490 FOR I=1 TO 9                       :rem 23
500 IF P(I)=0 THEN 540                 :rem 67
510 NEXT I                             :rem 30
520 PRINT "TIE GAME!"                  :rem 133
530 GOTO 1590                          :rem 160
540 N=ABS(N-4)                         :rem 250
550 RETURN                             :rem 122
560 PRINT "{CLR}{BLU}":POKE 53281,1
                                       :rem 231
570 W=54276:POKE W,0                   :rem 84
580 PRINT TAB(15)"TIC-TAC-TOE"         :rem 246
590 FOR I=1 TO 9:READ S(I):NEXT I      :rem 29
600 DATA 1114,1122,1130,1434,1442      :rem 73
610 DATA 1450,1754,1762,1770           :rem 111
620 PRINT "{2 DOWN}CHOOSE ONE OF THE POSI
    TION NUMBERS."                     :rem 99
630 PRINT "{DOWN}TRY TO GET THREE IN A RO
    W."                                :rem 115
640 POKE 54296,15:F1=54273:F2=54272:C=F2
                                       :rem 125
650 POKE W+1,128:POKE W+2,16           :rem 244
660 A=160:CC(1)=6:CC(3)=10             :rem 72
670 PRINT "{DOWN}ALTERNATE TURNS WITH THE
     COMPUTER."                        :rem 117
680 PRINT "{DOWN}{BLK}X{BLU} GETS FIRST M
    OVE."                              :rem 167
690 Y=3:Z=1:CH=2                       :rem 158
700 PRINT "{2 DOWN}CHOOSE{2 SPACES}{BLK}F
    1{BLU} FOR {BLK}X{BLU}"            :rem 95
710 PRINT TAB(8)"{BLK}F3{BLU} FOR {BLK}O
    {BLU}"                             :rem 214
720 GET E$:IF E$<>"{F1}" AND E$<>"{F3}" T
    HEN 720                            :rem 159
730 IF E$="{F1}"THEN Y=1:Z=3           :rem 146
740 POKE 198,0                         :rem 200
750 PRINT "{2 DOWN}CHOOSE{2 SPACES}{BLK}F
    1{BLU} BEGINNER"                   :rem 192
760 PRINT TAB(8)"{BLK}F3{BLU} INTERMEDIAT
    E"                                 :rem 113
770 GET E$:IF E$<>"{F1}" AND E$<>"{F3}" T
    HEN 770                            :rem 169
780 IF E$="{F1}" THEN CH=1             :rem 197
790 PRINT "{CLR}":CT=INT(14*RND(0))+2
                                       :rem 159
800 FOR I=1 TO 9:P(I)=0:NEXT I         :rem 101
810 FOR I=1080 TO 1960 STEP 40         :rem 226
820 POKE I,A:POKE I+C,CT               :rem 98
830 POKE I+8,A:POKE I+8+C,CT           :rem 41
840 NEXT I                             :rem 36
850 FOR I=1353 TO 1375                 :rem 73
860 POKE I,A:POKE I+C,CT:POKE I+320,A:POK
    E I+320+C,CT                       :rem 232
870 NEXT I                             :rem 39
880 FOR I=1 TO 9:POKE S(I)+82,I+48:rem 17
890 POKE S(I)+82+C,0:NEXT I            :rem 222
900 N=1                                :rem 85
910 IF CH=2 THEN 1040                  :rem 23
920 IF Y=1 THEN 970{5 SPACES}          :rem 192
930 REM COMPUTER'S MOVE                :rem 160
940 E=INT(9*RND(0)+1):IF P(E)<>0 THEN 940
                                       :rem 164
950 GOSUB 340                          :rem 181
960 REM YOUR MOVE                      :rem 9
970 GOSUB 300                          :rem 179
980 GET E$:IF E$=""THEN 980            :rem 109
990 IF E$<"1" OR E$>"9" THEN 980 :rem 224
1000 E=VAL(E$):IF P(E)<>0 THEN 970 :rem 8
1010 GOSUB 340                         :rem 217
1020 ON CH GOTO 940,1060               :rem 180
1030 REM COMPUTER'S MOVE               :rem 200
1040 IF Y=1 THEN 970                   :rem 234
1050 REM CENTER POSITION               :rem 224
1060 IF P(5)=0 THEN E=5:GOTO 1520:rem 186
1070 IF P(5)=X THEN 1140               :rem 183
1080 REM DIAGONALS                     :rem 63
1090 IF P(1)=0 AND P(9)=Z THEN E=1:GOTO 1
    520                                :rem 249
1100 IF P(1)=Z AND P(9)=0 THEN E=9:GOTO 1
    520                                :rem 249
1110 IF P(3)=0 AND P(7)=Z THEN E=3:GOTO 1
    520                                :rem 244
1120 IF P(3)=Z AND P(7)=0 THEN E=7:GOTO 1
    520                                :rem 249
1130 REM COLUMNS                       :rem 202
1140 FOR K=1 TO 3                      :rem 60
1150 IF P(K)=X OR P(K+3)=X OR P(K+6)=X TH
    EN 1200                            :rem 204
1160 IF P(K)+P(K+3)+P(K+6)<>2*Z THEN 1200
                                       :rem 82
1170 IF P(K)=0 THEN E=K:GOTO 1520:rem 232
1180 IF P(K+3)=0 THEN E=K+3:GOTO 1520
                                       :rem 165
1190 E=K+6:GOTO 1520                   :rem 52
1200 NEXT K                            :rem 77
1210 REM ROWS                          :rem 243
1220 FOR K=1 TO 7 STEP 3               :rem 174
1230 IF P(K)=X OR P(K+1)=X OR P(K+2)=X TH
    EN 1280                            :rem 205
1240 IF P(K)+P(K+1)+P(K+2)<>2*Z THEN 1280
                                       :rem 83
1250 IF P(K)=0 THEN E=K:GOTO 1520:rem 231
1260 IF P(K+1)=0 THEN E=K+1:GOTO 1520
                                       :rem 160
```

```
1270 E=K+2:GOTO 1520                          :rem 47
1280 NEXT K                                   :rem 85
1290 REM PREVENT COLUMN                       :rem 162
1300 FOR K=1 TO 3                             :rem 58
1310 IF P(K)=Z OR P(K+3)=Z OR P(K+6)=Z TH
     EN 1360                                  :rem 215
1320 IF P(K)+P(K+3)+P(K+6)<>2*X THEN 1360
                                              :rem 85
1330 IF P(K)=0 THEN E=K:GOTO 1520:rem 230
1340 IF P(K+3)=0 THEN E=K+3:GOTO 1520
                                              :rem 163
1350 E=K+6:GOTO 1520                          :rem 50
1360 NEXT K                                   :rem 84
1370 REM PREVENT ROW                          :rem 203
1380 FOR K=1 TO 7 STEP 3                      :rem 181
1390 IF P(K)=Z OR P(K+1)=Z OR P(K+2)=Z TH
     EN 1440                                  :rem 216
1400 IF P(K)+P(K+1)+P(K+2)<>2*X THEN 1440
                                              :rem 77
1410 IF P(K)=0 THEN E=K:GOTO 1520:rem 229
1420 IF P(K+1)=0 THEN E=K+1:GOTO 1520
                                              :rem 158
1430 E=K+2:GOTO 1520                          :rem 45
1440 NEXT K                                   :rem 83
1450 IF P(5)=Z THEN 1500                      :rem 187
1460 IF P(1)=0 AND P(9)=X THEN E=1:GOTO 1
     520                                      :rem 248
1470 IF P(1)=X AND P(9)=0 THEN E=9:GOTO 1
     520                                       :rem 1
1480 IF P(3)=0 AND P(7)=X THEN E=3:GOTO 1
     520                                      :rem 252
1490 IF P(3)=X AND P(7)=0 THEN E=7:GOTO 1
     520                                       :rem 1
1500 GOTO 940                                 :rem 156
1510 REM                                      :rem 171
1520 GOSUB 340                                :rem 223
1530 GOTO 970                                 :rem 162
1540 REM GAME OVER                             :rem 4
1550 IF X<>Y THEN 1580                        :rem 130
1560 PRINT "YOU WIN!!!"                       :rem 235
1570 GOTO 1590                                :rem 213
1580 PRINT "COMPUTER WINS!!"                  :rem 145
1590 FOR I=1 TO 20                            :rem 114
1600 POKE F1,INT(60*RND(0)+30)                 :rem 88
1610 POKE F2,INT(200*RND(0)+10)               :rem 132
1620 GOSUB 310                                :rem 221
1630 NEXT I                                    :rem 82
1640 PRINT "{22 DOWN}TRY AGAIN? (Y/N)";
                                              :rem 18
1650 GET E$:IF E$="N" THEN 1690                :rem 21
1660 IF E$<>"Y" THEN 1650                     :rem 215
1670 CLR                                      :rem 175
1680 GOTO 560                                 :rem 163
1690 PRINT "{CLR}"                             :rem 52
1700 END                                      :rem 159
```

Program 2: Tic-Tac-Toe (VIC Version)

```
1 GOTO28                                      :rem 212
2 POKEM,77:POKEM+3,78:POKEM+23,77:POKEM+2
  4,78:POKEM+45,78                            :rem 158
3 POKEM+46,77:POKEM+66,78:POKEM+69,77:RET
  URN                                         :rem 202
4 POKEM,85:POKEM+1,67:POKEM+2,67:POKEM+3,
  73:POKEM+22,66:POKEM+23,32:POKEM+25,93
                                              :rem 222
5 POKEM+44,66:POKEM+47,93:POKEM+66,74:POK
  EM+67,64:POKEM+68,64:POKEM+69,75:RETURN
                                              :rem 111
6 FORI=M+C TOM+C+66 STEP22:POKEI,CC(N):PO
  KEI+1,CC(N):POKEI+2,CC(N)                   :rem 181
7 POKEI+3,CC(N):NEXT:RETURN                   :rem 241
8 POKEF1,231                                  :rem 160
9 FORD=1TO60:NEXT:POKEF1,0:RETURN:rem 170
10 X=N:P(E)=X:M=S(E):ONX GOSUB2,2,4
                                              :rem 69
11 GOSUB6                                     :rem 24
12 FORI=1TO7STEP3                             :rem 74
13 IFP(I)<>P(I+1)THEN16                       :rem 51
14 IFP(I)<>P(I+2)THEN16                       :rem 53
15 ONP(I)+1GOTO16,89,89,89                    :rem 192
16 NEXT                                       :rem 166
17 FORI=1TO3                                  :rem 220
18 IFP(I)<>P(I+3)THEN21                       :rem 54
19 IFP(I)<>P(I+6)THEN21                       :rem 58
20 ONP(I)+1GOTO21,89,89,89                    :rem 184
21 NEXT                                       :rem 162
22 IFP(5)<>X THEN25                           :rem 49
23 IF(P(1)=X)AND(P(9)=X)THEN89                :rem 223
24 IF(P(3)=X)AND(P(7)=X)THEN89                :rem 224
25 FORI=1TO9:IFP(I)=0THEN27                   :rem 153
26 NEXT:PRINT"TIE GAME!":GOTO92               :rem 173
27 N=ABS(N-4):RETURN                          :rem 228
28 PRINT"{CLR}{BLU}":PRINTTAB(5)"TIC-TAC-
   TOE":FORI=1TO9:READS(I):NEXT               :rem 191
29 DATA7726,7733,7740,7880,7887,7894,8034
   ,8041,8048                                 :rem 98
30 PRINT"{2 DOWN}CHOOSE ONE OF THE":PRINT
   "POSITION NUMBERS.":PRINT"{DOWN}GET 3
   {SPACE}IN A ROW."                          :rem 102
31 POKE36878,15:F1=36876:C=30720:CC(1)=6:
   CC(3)=2:Y=3:Z=1:H=2                        :rem 69
32 PRINT"{DOWN}{BLK}X{BLU} GETS FIRST MOV
   E.":PRINT"{DOWN}CHOOSE {BLK}F1{BLU} FO
   R {BLK}X":PRINTTAB(7)"F3{BLU} FOR
   {BLK}0{BLU}"                                :rem 8
33 GETE$:IFE$<>"{F1}"ANDE$<>"{F3}"THEN33
                                              :rem 57
34 IFE$="{F1}"THENY=1:Z=3                     :rem 95
35 PRINT"{2 DOWN}CHOOSE {BLK}F1{BLU} BEGI
   NNER":PRINTTAB(7)"{BLK}F3{BLU} INTERME
   DIATE"                                     :rem 153
36 GETE$:IFE$<>"{F1}"ANDE$<>"{F3}"THEN36
                                              :rem 63
37 IFE$="{F1}"THENH=1                         :rem 77
38 PRINT"{CLR}":T=INT(6*RND(0))+2:FORI=1T
   O9:P(I)=0:NEXT                             :rem 182
39 FORI=7709TO8129STEP22:POKEI,160:POKEI+
   C,T:POKEI+7,160:POKEI+7+C,T:NEXT
                                              :rem 46
40 FORI=7835TO7854:POKEI,160:POKEI+C,T:PO
   KEI+154,160:POKEI+154+C,T:NEXT             :rem 80
41 FORI=1TO9:POKES(I)+23,I+48:POKES(I)+23
   +C,0:NEXT                                  :rem 250
42 N=1:IFH=2THEN51                            :rem 55
43 IFY=1THEN46                                :rem 86
44 E=INT(9*RND(0)+1):IFP(E)<>0THEN44
                                              :rem 58
45 GOSUB10                                    :rem 74
46 GOSUB8                                     :rem 34
47 GETE$:IFE$=""THEN47                         :rem 1
48 IFE$<"1"ORE$>"9"THEN47                     :rem 116
49 E=VAL(E$):IFP(E)<>0THEN46                  :rem 126
50 GOSUB10:ONH GOTO44,52                      :rem 153
51 IFY=1THEN46                                :rem 85
52 IFP(5)=0THENE=5:GOTO88                      :rem 2
53 IFP(5)=X THEN58                            :rem 254
54 IFP(1)=0ANDP(9)=Z THENE=1:GOTO88
                                              :rem 64
55 IFP(1)=Z ANDP(9)=0THENE=9:GOTO88
                                              :rem 73
56 IFP(3)=0ANDP(7)=Z THENE=3:GOTO88
                                              :rem 68
```

```
57 IFP(3)=Z ANDP(7)=ØTHENE=7:GOTO88
                                    :rem 73
58 FORK=1TO3:IF(P(K)=X)+(P(K+3)=X)+(P(K+6
   )=X)THEN63                       :rem 207
59 IFP(K)+P(K+3)+P(K+6)<>2*Z THEN63
                                    :rem 158
60 IF P(K)=ØTHENE=K:GOTO88          :rem 45
61 IFP(K+3)=ØTHENE=K+3:GOTO88       :rem 234
62 E=K+6:GOTO88                     :rem 121
63 NEXT                             :rem 168
64 FORK=1TO7STEP3:IF(P(K)=X)+(P(K+1)=X)+(
   P(K+2)=X)THEN69                  :rem 63
65 IFP(K)+P(K+1)+P(K+2)<>2*Z THEN69
                                    :rem 155
66 IFP(K)=ØTHENE=K:GOTO88           :rem 51
67 IFP(K+1)=ØTHENE=K+1:GOTO88       :rem 236
68 E=K+2:GOTO88                     :rem 123
69 NEXT                             :rem 174
70 FORK=1TO3:IF(P(K)=Z)+(P(K+3)=Z)+(P(K+6
   )=Z)THEN75                       :rem 210
71 IFP(K)+P(K+3)+P(K+6)<>2*X THEN75
                                    :rem 153
72 IFP(K)=ØTHENE=K:GOTO88           :rem 48
73 IFP(K+3)=ØTHENE=K+3:GOTO88       :rem 237
74 E=K+6:GOTO88                     :rem 124
75 NEXT                             :rem 171
76 FORK=1TO7STEP3:IF(P(K)=Z)+(P(K+1)=Z)+(
   P(K+2)=Z)THEN81                  :rem 66
77 IFP(K)+P(K+1)+P(K+2)<>2*X THEN81
                                    :rem 150
78 IFP(K)=ØTHEN E=K:GOTO88          :rem 54
79 IFP(K+1)=ØTHENE=K+1:GOTO88       :rem 239
80 E=K+2:GOTO88                     :rem 117
81 NEXT                             :rem 168
82 IFP(5)=Z THEN87                   :rem 4
83 IFP(1)=ØANDP(9)=X THENE=1:GOTO88
                                    :rem 64
84 IFP(1)=X ANDP(9)=ØTHENE=9:GOTO88
                                    :rem 73
85 IFP(3)=ØANDP(7)=X THENE=3:GOTO88
                                    :rem 68
86 IFP(3)=X ANDP(7)=ØTHENE=7:GOTO88
                                    :rem 73
87 GOTO44                           :rem 16
88 GOSUB1Ø:GOTO46                   :rem 46
89 IFX<>Y THEN91                    :rem 196
90 PRINT"YOU WIN!!!":GOTO92         :rem 102
91 PRINT"COMPUTER WINS!!"            :rem 45
92 FORI=1TO2Ø:POKEF1,INT(2Ø*RND(Ø)+2ØØ):G
   OSUB9:NEXT                       :rem 112
93 PRINT"{2Ø DOWN}TRY AGAIN? (Y/N)";
                                    :rem 145
94 GETE$:IFE$="N"THEN97              :rem 86
95 IFE$<>"Y"THEN94                   :rem 25
96 CLR:GOTO28                        :rem 45
97 PRINT"{CLR}":END                 :rem 229
```

Inside Random Numbers

See article on page 98.

BEFORE TYPING...

Before typing in programs, please refer to "How To Type COMPUTE!'s Gazette Programs," "A Beginner's Guide To Typing In Programs," and "The Automatic Proofreader" that appear before the Program Listings.

Random Number Test

```
1 PRINT"{CLR}{DOWN} PRESS {RVS}R{OFF} TO
  {SPACE}RANDOMIZE."                :rem 163
2 GETA$:IFA$=""THEN2                :rem 135
3 IFA$="R"THENX=RND(-TI)            :rem 189
5 POKE56,27:CLR:PRINT"{CLR}{DOWN} PLEASE
  {SPACE}WAIT..."                   :rem 167
7 B=7168:C=7679:FORA=BTOC:POKEA,Ø:NEXT
                                    :rem 105
10 B=885:C=947:FORA=BTOC:READD:POKEA,D:NE
   XT                               :rem 215
20 PRINT"{CLR}{DOWN} {RVS}V{OFF}IC OR 64?
   "                                :rem 167
25 PRINT"{DOWN} PRESS {RVS}V{OFF} FOR VIC
   "                                :rem 153
26 PRINT" {RVS}RETURN{OFF} FOR 64."
                                    :rem 60
30 GETA$:IFA$=""THEN3Ø              :rem 233
35 IFA$<>"V"THEN5Ø                    :rem 4
40 POKE888,39:POKE892,148           :rem 168
50 PRINT"{CLR}{DOWN} PRESS {RVS}F1{OFF} T
   O TEST"                          :rem 101
51 PRINT" RANDOM SEEDS."            :rem 154
60 PRINT"{DOWN} PRESS {RVS}F3{OFF} TO TES
   T"                               :rem 213
61 PRINT" BASIC {RVS}RND{OFF} COMMAND."
                                    :rem 79
70 GETA$:IFA$=""THEN7Ø              :rem 241
80 IFA$="{F1}"THENGOTO1ØØØ          :rem 139
90 IFA$="{F3}"THENGOTO2ØØØ          :rem 142
100 GOTO5Ø                          :rem 47
885 DATA165,197,201,4,240,55,32,151
                                    :rem 243
893 DATA224,165,143,133,251,169,254,133
                                    :rem 191
901 DATA253,169,27,133,254,160,255,24
                                    :rem 86
909 DATA165,253,105,2,133,253,165,254
                                    :rem 86
917 DATA105,Ø,133,254,2ØØ,196,251,2Ø8
                                    :rem 75
925 DATA238,160,Ø,24,177,253,105,1
                                    :rem 184
933 DATA145,253,2ØØ,177,253,105,Ø,145
                                    :rem 76
941 DATA253,201,255,2Ø8,195,96,Ø,Ø
                                    :rem 189
1ØØØ PRINT"{CLR}{DOWN} PRESS 1-5 TO TEST"
                                    :rem 57
1Ø1Ø PRINT" RANDOM SEEDS."          :rem 246
1Ø2Ø PRINT"{2 DOWN} {RVS}PRESS{4 SPACES}T
     EST BYTE:{OFF}"                :rem 149
1Ø3Ø PRINT"{DOWN}{3 SPACES}1{9 SPACES}139
     "                              :rem 116
1Ø4Ø PRINT"{3 SPACES}2{9 SPACES}14Ø"
                                    :rem 93
1Ø5Ø PRINT"{3 SPACES}3{9 SPACES}141"
                                    :rem 96
1Ø6Ø PRINT"{3 SPACES}4{9 SPACES}142"
                                    :rem 99
1Ø7Ø PRINT"{3 SPACES}5{9 SPACES}143"
                                    :rem 102
1Ø8Ø GETA$:IFA$=""THEN1Ø8Ø           :rem 181
1Ø9Ø A=VAL(A$):IFA<1ORA>5THEN1ØØØ:rem 157
11ØØ POKE895,138+A                  :rem 203
1110 PRINT"{CLR}{DOWN} TESTING RANDOM SEE
     D"                             :rem 56
112Ø PRINT" BYTE ";A+138;"{LEFT}.":rem 86
113Ø PRINT"{DOWN} PRESS {RVS}F1{OFF} TO S
     TOP."                          :rem 102
1140 SYS885:GOTO3ØØØ                :rem 160
2ØØØ POKE945,4:POKE946,169:POKE947,255:PO
```

```
     KE948,133:POKE949,176:POKE950,96
                                    :rem 236
2002 FORA=891TO897:POKEA,234:NEXT:rem 254
2005 PRINT"{CLR}{DOWN} TESTING BASIC
     {RVS}RND{OFF}"                 :rem 68
2010 PRINT" COMMAND."               :rem 193
2020 PRINT"{DOWN} ENTER NUMBER RANGE:"
                                    :rem 148
2030 PRINT" (0 - 255)"              :rem 224
2035 PRINT"{DOWN} ENTER TWO NUMBERS"
                                    :rem 64
2036 PRINT" SEPARATED BY A COMMA.{DOWN}"
                                    :rem 189
2040 INPUTA,B                        :rem 5
2050 IFA<0ORA>255THEN2000           :rem 176
2060 IFB<0ORB>255THEN2000           :rem 179
2070 PRINT"{CLR}{DOWN} TESTING {RVS}RND
     {OFF} COMMAND."                :rem 17
2080 PRINT"{DOWN} RANGE= ";A;"-";B
                                    :rem 251
2090 PRINT"{2 DOWN} PRESS {RVS}F1{OFF} TO
      STOP."                        :rem 125
2100 X=251:Y=176:Z=255:R=(ABS(A-B))+1:POK
     EY,0                           :rem 54
2110 IFA<BTHENL=A                   :rem 11
2120 IFB<ATHENL=B                   :rem 13
2130 POKEX,INT((RND(1)*R)+L):SYS885:IFPEE
     K(Y)=ZTHEN3000                 :rem 94
2140 GOTO2130                       :rem 198
3000 POKE198,0:GOSUB3500            :rem 114
3010 B=7168:C=7678:Q=256:L=20:FORA=BTOCST
     EP2                            :rem 110
3020 PRINTCT,PEEK(A)+Q*PEEK(A+1):N=N+1:CT
     =CT+1:IFN=>LTHENGOSUB3200      :rem 71
3030 NEXT                            :rem 5
3100 PRINT"{2 DOWN}{2 SPACES}(PRESS ANY K
     EY)"                           :rem 102
3110 GETA$:IFA$=""THEN3110          :rem 173
3120 GOTO4000                       :rem 195
3200 N=0                            :rem 128
3210 GETA$:IFA$=""THEN3210          :rem 175
3220 GOSUB3500:RETURN               :rem 41
3500 PRINT"{CLR}NUMBER","COUNT{DOWN}":RET
     URN                            :rem 25
4000 PRINT"{CLR}{DOWN} REQUEST ANALYSIS?"
                                    :rem 5
4002 PRINT"{DOWN} (PRESS {RVS}Y{OFF} OR
     {RVS}N{OFF})"                  :rem 22
4004 GETA$:IFA$=""THEN4004          :rem 179
4006 IFA$<>"Y"THEN5000              :rem 201
4008 PRINT"{CLR}{DOWN} PLEASE WAIT..."
                                    :rem 186
4009 B=7168:C=7678:D=2:TT=0:CT=0:HI=0:LO=
     65535:ZZ=0:G=256               :rem 58
4010 FORA=BTOCSTEPD                 :rem 210
4020 N=PEEK(A)+G*PEEK(A+1)          :rem 183
4030 IFN=0THENZZ=ZZ+1:GOTO4040      :rem 124
4035 GOSUB4500                      :rem 21
4040 NEXT                            :rem 7
4100 PRINT"{CLR}{DOWN} {RVS}RANDOM ANALYS
     IS:"                           :rem 171
4110 PRINT"{DOWN} TOTAL NUMBERS HIT:"
                                    :rem 103
4120 PRINT"{3 SPACES}";CT           :rem 106
4130 PRINT"{DOWN} TOTAL COUNT:"     :rem 241
4140 PRINT"{3 SPACES}";TT           :rem 125
4150 PRINT"{DOWN} AVERAGE COUNT:":rem 106
4160 PRINT"{3 SPACES}";TT/CT         :rem 69
4170 PRINT"{DOWN} LOWEST COUNT:"    :rem 79
4180 PRINT"{3 SPACES}";LO           :rem 116
4190 PRINT"{DOWN} HIGHEST COUNT:":rem 127
4200 PRINT"{3 SPACES}";HI           :rem 99
4210 PRINT"{DOWN} TOTAL ZEROES:"    :rem 63
4220 PRINT"{3 SPACES}";ZZ           :rem 136
4230 CLR:PRINT"{DOWN}{RVS}R{OFF} TO REPEA
     T ANALYSIS."                   :rem 178
4240 GETA$:IFA$=""THEN4240          :rem 183
4400 IFA$="R"THEN3000               :rem 129
4410 GOTO5000                       :rem 199
4500 CT=CT+1:TT=TT+N                :rem 208
4510 IFN>HITHENHI=N                 :rem 193
4520 IFN<LOTHENLO=N                 :rem 212
4530 RETURN                         :rem 172
5000 PRINT"{CLR} PROGRAM ENDED."    :rem 207
```

Power BASIC

See article on page 112.

BEFORE TYPING...

Before typing in programs, please refer to "How To Type COMPUTE!'s Gazette Programs," "A Beginner's Guide To Typing In Programs," and "The Automatic Proofreader" that appear before the Program Listings.

Power BASIC: One-Touch Keywords

```
140 IF PEEK(PEEK(56)*256)<>120THENPOKE56,
    PEEK(56)-1:CLR                  :rem 158
150 HI=PEEK(56):BASE=HI*256          :rem 47
160 PRINT"{CLR}PATIENCE..."         :rem 206
170 FOR AD=0 TO 211: READ BY        :rem 153
180 POKE BASE+AD,BY: NEXT AD         :rem 88
190 :                               :rem 212
200 REM RELOCATION ADJUSTMENTS      :rem 184
210 POKE BASE+26,HI: POKE BASE+81,HI
                                     :rem 2
220 POKE BASE+123,HI: POKE BASE+133,HI
                                    :rem 95
230 :                               :rem 207
231 ::IF PEEK(65532)=34 GOTO 240    :rem 135
232 ::POKE BASE+9,72: POKE BASE+48,194
                                    :rem 51
233 ::POKE BASE+52,235: POKE BASE+92,160
                                    :rem 139
234 ::POKE BASE+154,72: POKE BASE+157,224
                                    :rem 193
235 ::POKE BASE+158,234             :rem 230
236 ::                               :rem 15
240 PRINT"{CLR}* ONE-TOUCH KEYWORDS *"
                                    :rem 88
250 PRINT"ON/OFF:{3 SPACES}SYS{RVS}";BASE
                                    :rem 176
260 END                             :rem 111
270 DATA 120,173,143,2,201,32       :rem 127
280 DATA 208,12,169,220,141,143     :rem 239
290 DATA 2,169,235,141,144,2         :rem 94
300 DATA 88,96,169,32,141,143       :rem 155
310 DATA 2,169,0,141,144,2          :rem 237
320 DATA 88,96,165,212,208,117      :rem 206
330 DATA 173,141,2,201,3,176         :rem 83
340 DATA 110,201,0,240,106,169      :rem 175
350 DATA 159,133,245,169,236,133     :rem 49
360 DATA 246,165,215,201,193,144     :rem 40
370 DATA 95,201,219,176,91,56       :rem 160
380 DATA 233,193,174,141,2,224      :rem 194
390 DATA 2,208,3,24,105,26          :rem 245
400 DATA 170,189,159,0,162,0         :rem 92
410 DATA 134,198,170,160,158,132     :rem 40
420 DATA 34,160,192,132,35,160      :rem 187
```

```
430 DATA 0,10,240,16,202,16          :rem 22
440 DATA 12,230,34,208,2,230         :rem 78
450 DATA 35,177,34,16,246,48         :rem 108
460 DATA 241,200,177,34,48,17        :rem 147
470 DATA 8,142,211,0,230,198         :rem 91
480 DATA 166,198,157,119,2,174       :rem 215
490 DATA 211,0,40,208,234,230        :rem 131
500 DATA 198,166,198,41,127,157      :rem 8
510 DATA 119,2,230,198,169,20        :rem 146
520 DATA 141,119,2,76,220,235        :rem 139
530 DATA 76,67,236                   :rem 127
540 :                                :rem 211
550 REM *TOKENS FOR SHIFT KEY        :rem 202
560 :                                :rem 213
570 DATA 153,175,199,135,161,129     :rem 56
580 DATA 141,164,133,137,134,147     :rem 42
590 DATA 202,181,159,151,163,201     :rem 37
600 DATA 196,139,192,149,150,155     :rem 52
610 DATA 191,138                     :rem 20
620 :                                :rem 210
630 REM *TOKENS FOR COMMODORE KEY:rem 240
640 :                                :rem 212
650 DATA 152,176,198,131,128,130     :rem 45
660 DATA 142,169,132,145,140,148     :rem 43
670 DATA 195,187,160,194,166,200     :rem 54
680 DATA 197,167,186,157,165,184     :rem 72
690 DATA 190,158,0                   :rem 121
700 ::                               :rem 11
710 ::REM *CHECKSUM ROUTINE          :rem 147
720 ::                               :rem 13
730 ::FOR AD=0 TO 158 : READ BY      :rem 25
740 ::CHKSUM = CHKSUM + BY : NEXT AD
                                     :rem 166
750 ::IF CHKSUM <> 20347 THEN PRINT "ERRO
    R!"                              :rem 143
```

Scroll 64

See article on page 127 for instructions on use.

```
10 DATA11507,12573,12522,11001
20 A=49152:B=84:C=A+B:FORI=1TO4:D=0:READX
   :FORJ=ATOC:D=D+PEEK(J):NEXT
30 IFD<>XTHENPRINTTAB(19)"ERROR IN BLOCK
   {SPACE}#"I:GOTO50
40 PRINT"BLOCK #"I"IS CORRECT"
50 A=C+1:C=A+B:NEXT:END
60 FORI=1TO4:READA:NEXT:READLO,HI:FORI=LO
   TOHI:READX:POKEI,X:NEXT:END
5000 DATA 49152, 49528
5010 DATA 174,114,193,224,3,144,3,76,117,
     192,188,114,193,140,121,193,174
5020 DATA 118,193,232,202,32,30,193,172,1
     21,193,173,119,193,201,2,208,10
5030 DATA 169,32,72,173,33,208,72,76,50,1
     92,177,90,72,177,92,72,204
5040 DATA 116,193,240,20,200,177,90,72,17
     7,92,136,145,92,104,145,90,200
5050 DATA 204,116,193,208,238,240,18,136,
     177,90,72,177,92,200,145,92,104
5060 DATA 145,90,136,204,115,193,208,238,
     173,119,193,201,0,208,5,104,104
5070 DATA 76,111,192,104,145,92,104,145,9
     0,236,117,193,208,160,96,172,116
5080 DATA 193,200,189,114,193,170,32,30,1
     93,173,120,193,201,2,208,19,136
5090 DATA 169,32,153,122,193,173,33,208,1
     53,162,193,204,115,193,208,239,240
5100 DATA 16,136,177,90,153,122,193,177,9
     2,153,162,193,204,115,193,208,240
5110 DATA 236,117,193,240,37,202,32,30,19
     3,172,116,193,200,136,177,90,72
5120 DATA 177,92,32,48,193,145,92,104,145
     ,90,32,56,193,204,115,193,208
5130 DATA 234,236,117,193,208,221,240,46,
     202,206,118,193,232,32,30,193,172
5140 DATA 116,193,200,136,32,48,193,177,9
     0,72,177,92,32,56,193,145,92
5150 DATA 104,145,90,204,115,193,208,234,
     236,118,193,208,221,238,118,193,232
5160 DATA 32,30,193,173,120,193,201,0,240
     ,20,172,115,193,136,200,185,162
5170 DATA 193,145,92,185,122,193,145,90,2
     04,116,193,208,240,96,189,89,193
5180 DATA 133,91,24,105,212,133,93,189,64
     ,193,133,90,133,92,96,72,152
5190 DATA 24,105,40,168,104,96,72,152,56,
     233,40,168,104,96,0,40,80
5200 DATA 120,160,200,240,24,64,104,144,1
     84,224,8,48,88,128,168,208,248
5210 DATA 32,72,112,152,192,4,4,4,4,4,4,4
     ,5,5,5,5,5
5220 DATA 5,6,6,6,6,6,6,6,7,7,7,7,7,3,0,4
     ,0
5230 DATA 4,1,1
```

Tape Data Files For VIC And 64

See article on page 130.

Program 1:
Files Written From Keyboard

```
200 REM{11 SPACES}* FILES WRITTEN *
                                     :rem 106
210 REM{11 SPACES}* FROM KEYBOARD *
                                      :rem 80
215 CLR                              :rem 121
220 INPUT"{CLR}{5 DOWN}NO. OF ITEMS IN FI
    LE";N                            :rem 114
225 DIMW$(N+1)                       :rem 233
230 INPUT"{DOWN}FILENAME";NAME$:IFNAME$="
    +1"THEN END                      :rem 44
240 PRINT"{DOWN}ON THE PROMPT,":PRINT"TYP
    E EACH ITEM,":PRINT"FOLLOWED BY {RVS}
    RETURN{OFF}"                     :rem 67
245 OPEN1,1,1,NAME$                  :rem 41
250 FORX=0TON:INPUTW$(X):PRINT#1,W$(X):IF
    W$(X)<>"-1"THEN NEXT              :rem 4
260 CLOSE1:FORX=0TON:PRINTW$(X):NEXT
                                     :rem 122
265 PRINT"HIT ANY KEY"               :rem 36
270 GETA$:IFA$=""THEN 270            :rem 85
280 GOTO200                          :rem 101
290 END                              :rem 114
```

Program 2: Files Written From Data

```
500 REM{10 SPACES}* FILE WRITTEN *:rem 26
510 REM{10 SPACES}*{2 SPACES}FROM DATA
    {3 SPACES}*                      :rem 28
520 REM                              :rem 123
540 DATAW21,DELIGHT,CHAPTER,FARTHER,BUILT
    ,JOYFUL,STORIES                  :rem 11
550 DATABOUGHT,SCARF,FILLED,SAILED,REMAIN
    ,CLOAK,PLACED,DRIVING,FEAST,STRONG,-1
                                     :rem 150
551 DATAW22,FLYING,SOMETIMES,HIGHWAY,SNOW
    ING,CLOSING                      :rem 16
```

```
560 DATABEDTIME,PUSHED,BRUSHES,DREAMING,B
    OOKCASE,PULLED                  :rem 196
570 DATAAIRPLANE,BUYING,SPENDING,SKATED,D
    ECEMBER,-1,+1                   :rem 221
580 READNAME$:R$=CHR$(13)           :rem 161
585 IFNAME$="+1"THENGOTO650          :rem 86
590 OPEN1,1,1,NAME$                  :rem 44
600 READWRD$:PRINT#1,WRD$;R$        :rem 204
620 IFWRD$<>"-1"THEN600              :rem 25
630 CLOSE1                           :rem 64
640 GOTO580                         :rem 112
650 CLOSE1:END                       :rem 83
```

Program 3: File Reader

```
300 REM{11 SPACES}*{4 SPACES}FILE
    {4 SPACES}*                     :rem 235
310 REM{11 SPACES}*{3 SPACES}READER
    {3 SPACES}*                     :rem 127
350 INPUT"{CLR}{8 DOWN}WHAT FILE";NAME$
                                    :rem 91
360 IFNAME$="+1"THEN END             :rem 80
370 OPEN1,1,0,NAME$:N=0:DIMW$(16)   :rem 99
380 INPUT#1,W$(N):N=N+1              :rem 52
390 IFW$(N-1)="-1"THEN410            :rem 70
400 GOTO380                         :rem 104
410 CLOSE1:FORX=0TO(N-1):PRINTW$(X):NEXT
                                    :rem 38
420 PRINT"HIT ANY KEY"               :rem 29
430 GETA$:IFA$=""THEN430             :rem 81
450 RUN350                           :rem 38
460 END                             :rem 113
```

3-D Tic-Tac-Toe

See article on page 50.

BEFORE TYPING...

Before typing in programs, please refer to "How To Type COMPUTE!'s Gazette Programs," "A Beginner's Guide To Typing In Programs," and "The Automatic Proofreader" that appear before the Program Listings.

Program 1:
3-D Tic-Tac-Toe—64 Version

```
1 PRINT"{CLR}":POKE53281,0:POKE53280,4
                                    :rem 40
2 DIMDI(28):FORI=1TO27:READX1:X2=X2+X1:DI
  (I+1)=X2:NEXTI:DI(1)=0            :rem 82
5 PRINTTAB(9)"{RED}{3 SPACES}{RVS}£
  {6 SPACES}{OFF}{2 SPACES}{RVS}
  {6 SPACES}§*³"                    :rem 193
6 PRINTTAB(9)"{2 SPACES}{RVS}£{8 SPACES}
  {OFF} {RVS}{7 SPACES}§*³"         :rem 166
7 PRINTTAB(9)" {RVS}£{9 SPACES}{OFF}
  {RVS}{8 SPACES}§*³"               :rem 167
8 PRINTTAB(9)"{BLU}{RVS}£{6 SPACES}{RED}
  {4 SPACES}{OFF} {RVS}{3 SPACES}{BLU}
  {6 SPACES}§*³"                    :rem 2
9 PRINTTAB(9)"{RVS}{8 SPACES}{RED}
  {3 SPACES}{OFF} {RVS}{3 SPACES}{BLU}
  {7 SPACES}§*³"                    :rem 59
10 PRINTTAB(9)"{RVS}{2 SPACES}{RED}{OFF}
   £{2 SPACES}{RVS}£{BLU}{2 SPACES}
   {RED}{3 SPACES}{OFF} {RVS}{3 SPACES}
   {BLU}{2 SPACES}{OFF} {RVS}{RED}
   {3 SPACES}{BLU}{2 SPACES}"       :rem 148
11 PRINTTAB(9)"{4 SPACES}{RVS}{RED}£
   {BLU}{2 SPACES}{RED}{3 SPACES}{OFF}
   {RVS}{3 SPACES}{BLU}{2 SPACES}{OFF}
   {RVS}{RED}{3 SPACES}{BLU}{2 SPACES}"
                                    :rem 72
12 PRINTTAB(9)"{3 SPACES}{RVS}{RED}£
   {2 SPACES}{BLU}{2 SPACES}{RED}
   {3 SPACES}{OFF} {RVS}{3 SPACES}{BLU}
   {2 SPACES}{OFF} {RVS}{RED}{3 SPACES}
   {BLU}{2 SPACES}"                 :rem 73
13 PRINTTAB(9)"{3 SPACES}{RVS}{5 SPACES}
   {RED}{3 SPACES}{OFF} {RVS}{3 SPACES}
   {BLU}{2 SPACES}{OFF} {RVS}{RED}
   {3 SPACES}{BLU}{2 SPACES}"       :rem 102
14 PRINTTAB(9)"{3 SPACES}{RVS}{5 SPACES}
   {RED}{3 SPACES}{OFF} {RVS}{3 SPACES}
   {BLU}{2 SPACES}{OFF} {RVS}{RED}
   {3 SPACES}{BLU}{2 SPACES}"       :rem 103
15 PRINTTAB(9)"{2 SPACES}{RVS}{RED}£
   {3 SPACES}{BLU}{2 SPACES}{RED}
   {3 SPACES}{OFF} {RVS}{3 SPACES}{BLU}
   {2 SPACES}{OFF} {RVS}{RED}{3 SPACES}
   {BLU}{2 SPACES}"                 :rem 76
16 PRINTTAB(9)" {RVS}{RED}£{4 SPACES}
   {BLU}{2 SPACES}{RED}{2 SPACES}{OFF}£
   {SPACE}{RVS}{3 SPACES}{BLU}{2 SPACES}
   {RED}{4 SPACES}{BLU}{2 SPACES}":rem 82
17 PRINTTAB(9)"{RVS}{RED}£{5 SPACES}
   {BLU}{2 SPACES}{RED} {OFF}£{2 SPACES}
   {RVS}{3 SPACES}{BLU}{2 SPACES}{RED}
   {4 SPACES}{BLU}{2 SPACES}"       :rem 83
18 PRINTTAB(9)"{RVS}{2 SPACES}{RED}
   {4 SPACES}{BLU}{2 SPACES}{RED}{OFF}£
   {3 SPACES}§*³{RVS}{2 SPACES}{BLU}
   {2 SPACES}{RED}{4 SPACES}{BLU}
   {2 SPACES}"                      :rem 138
19 PRINTTAB(9)"{RVS}{7 SPACES}{OFF}£
   {5 SPACES}{RED}§*³{RVS} {BLU}
   {7 SPACES}{OFF}£"                :rem 80
20 PRINTTAB(9)"§*³{RVS}{5 SPACES}{OFF}£
   {7 SPACES}{RED}§*³{RVS}{BLU}{6 SPACES}
   {OFF}£"                          :rem 39
25 PRINTTAB(9)"{DOWN}{CYN}T I C{RED} CC
   {CYN}T A C{RED} CC{CYN} T O E":rem 107
30 PRINTTAB(12)"{4 DOWN}§3FIREBUTTON TO
   {SPACE}PLAY"                     :rem 116
35 IF(PEEK(56321)AND16)=16AND(PEEK(56320)
   AND16)=16THEN35                  :rem 172
52 PRINT"{CLR}§6";:POKE53281,0:DIMP(27):
   O=1                              :rem 124
53 PH=54272:CU=32:CC=0:S=54272      :rem 176
54 POKES+13,240                      :rem 60
55 P(1)=1119:P(2)=1122:P(3)=1125:P(4)=120
   1:P(5)=1204:P(6)=1207:P(8)=1286
                                    :rem 198
56 P(7)=1283                         :rem 78
57 P(9)=1289:P(10)=1439:P(11)=1442:P(12)=
   1445:P(13)=1521:P(14)=1524:P(15)=1527
                                    :rem 10
58 P(16)=1603:P(17)=1606:P(18)=1609:P(19)
   =1759:P(20)=1762:P(21)=1765      :rem 10
59 P(22)=1841:P(23)=1844:P(24)=1847:P(25)
   =1923:P(26)=1926:P(27)=1929      :rem 20
60 FORD=1TO2:PRINT"PLAYER #";D;:INPUTPL$(
   D):NEXT:CO(1)=4:CO(2)=5          :rem 161
61 FORV=1TO2:PL$(V)=LEFT$(PL$(V),9):NEXT
                                    :rem 170
63 M(2)=87:M(1)=86:L=1              :rem 141
65 INPUT"HOW MANY ROUNDS";RD         :rem 14
70 U(1)=56321:U(2)=56320            :rem 203
90 PRINT"{CLR}{RED}";:FORV=1TO3     :rem 223
100 PRINTTAB(12)"§9 @³"             :rem 177
```

```
110 PRINTTAB(12)"{RVS}{*3}{OFF}{2 SPACES}M
    {2 SPACES}M{2 SPACES}M"          :rem 216
120 PRINTTAB(12)"{*3}{RVS}{*3}{OFF}{@3 M{@3
     M{@3 M"                         :rem 164
130 PRINTTAB(13)"{*3}{RVS}{*3}{OFF}{2 T3M
    {2 T3M{2 T3M"                    :rem 140
140 PRINTTAB(14)"{*3}{RVS}{*3}{OFF}{@3 M{@3
     M{@3 M"                         :rem 168
150 PRINTTAB(15)"{*3}{RVS}{*3}{OFF}{2 T3M
    {2 T3M{2 T3M"                    :rem 144
160 PRINTTAB(16)"{*3}{RVS}{*3}{OFF}
    {2 SPACES}M{2 SPACES}M{2 SPACES}M"
                                     :rem 192
170 PRINTTAB(17)"{*3}{RVS}{9 SPACES}"
                                     :rem 234
175 ONVGOTO176,177,330               :rem 244
176 PRINT"{BLU}";:NEXT               :rem 66
177 PRINT"{YEL}";:NEXT               :rem 194
330 R=1                              :rem 86
340 POKEP(O),160:POKEP(O)+PH,1       :rem 242
350 PRINT"{HOME}{YEL}ROUND:{6}";R;"{HOME}
    {6 DOWN}{6}":PRINTPL$(L);"'S TURN";
                                     :rem 52
351 FORV=1TO12-LEN(PL$(L))-2:PRINT" ";:NE
    XT                               :rem 34
360 J=15-(PEEK(U(L))AND15)           :rem 165
380 IFJ=8THENPP=1:GOTO410            :rem 46
390 IFJ=4THENPP=-1:GOTO420           :rem 89
400 GOTO459                          :rem 111
410 IFO=27THENO=26:NX=CU:NC=CC:GOTO433
                                     :rem 140
415 NX=PEEK(P(O+1)):NC=PEEK(P(O+1)+PH):GO
    TO430                            :rem 214
420 IFO=1THENO=2:NX=CU:NC=CC:GOTO433
                                     :rem 31
425 NX=PEEK(P(O-1)):NC=PEEK(P(O-1)+PH)
                                     :rem 209
430 POKEP(O),CU:POKEP(O)+PH,CC       :rem 72
433 O=O+PP                           :rem 64
435 CU=NX:CC=NC                      :rem 165
440 POKEP(O),160:POKEP(O)+PH,1       :rem 243
441 POKES+11,17:POKES+8,70:POKES+24,15
                                     :rem 205
442 FORD=1TO20:NEXT:POKES+24,0:POKES+11,1
    6:GOTO460                        :rem 67
459 FORD=1TO15:NEXT                  :rem 189
460 POKEP(O),CU:POKEP(O)+PH,CC:FORD=1TO45
    :NEXT:POKEP(O),160:POKEP(O)+PH,1
                                     :rem 56
470 J=PEEK(U(L))AND16:IFJ=16THEN360
                                     :rem 67
475 IFCU=32THEN480                   :rem 52
476 POKES+11,17:POKES+8,14:POKES+24,15
                                     :rem 211
477 FORD=1TO500:NEXT:POKES+24,0:POKES+11,
    16:GOTO360                       :rem 125
480 POKEP(O),M(L):POKEP(O)+PH,CO(L):CU=M(
    L):CC=CO(L)                      :rem 109
481 POKES+11,17:POKES+8,200:POKES+24,15
                                     :rem 252
482 FORD=1TO250:NEXT:POKES+11,16:POKES+24
    ,0                               :rem 111
485 A=0:B=0:C=0                      :rem 34
490 RESTORE:READX:FOR I=1TODI(O)+13:READX
    ,Y:NEXTI                         :rem 155
495 FORI=DI(O)+1TODI(O+1)            :rem 196
500 READ X,Y:IF(PEEK(P(X))=M(L))AND(PEEK(
    P(Y))=M(L))THEN B=X:C=Y:A=O      :rem 25
510 NEXTI                            :rem 30
740 IFA=0THEN923                     :rem 165
745 PRINT"{HOME}{7 DOWN}";PL$(L);" WINS!"
    ;                                :rem 175
746 FORV=1TO12-LEN(PL$(L))-2:PRINT" ";:NE
    XT                               :rem 42
747 SC(L)=SC(L)+1                    :rem 161
750 T=255:POKES+11,17:POKES+24,15:FORX=1T
    O10                              :rem 112
760 H=INT(16*RND(1))                 :rem 85
770 POKEP(A)+PH,H                    :rem 230
780 POKEP(B)+PH,H                    :rem 232
790 POKEP(C)+PH,H                    :rem 234
800 POKES+8,T:FORD=1TO350:NEXT:T=T-26:NEX
    T:POKES+11,16:POKES+24,0:GOTO920
                                     :rem 68
920 FORO=1TO27:POKEP(O),32:POKEP(O)+PH,0:
    NEXT                             :rem 38
923 IFL=1THENL=2:GOTO930             :rem 224
925 L=1                              :rem 90
930 IFA=0THEN350                     :rem 160
940 CU=32:CC=0:NX=0:NC=0:O=1         :rem 128
945 R=R+1:IFR>RDTHEN950              :rem 155
946 GOTO350                          :rem 116
950 PRINT"{CLR}{7 DOWN}{17 SPACES}"
                                     :rem 121
955 PRINT"{9 RIGHT}{3 DOWN}FINAL SCORE"
                                     :rem 146
957 PRINT"{9 RIGHT}{YEL}{11 Y3}{GRN}"
                                     :rem 20
960 PRINT"{2 RIGHT}"PL$(1);":";SC(1)
                                     :rem 248
970 PRINT"{DOWN}{2 RIGHT}"PL$(2);":";SC(2
    )                                :rem 12
980 PRINT"{DOWN}{2 RIGHT}{3}FIREBUTTON TO
     PLAY AGAIN"                     :rem 142
990 IF(PEEK(U(1))AND16)=16THENIF(PEEK(U(2
    ))AND16)=16THEN990               :rem 185
1000 POKE198,0:RUN                   :rem 29
1080 DATA 7,4,7,4,5,4,7,4,7,4,5,4,5,12,5,
     4,5,4,7,4,7,4,5,4,7,4,7         :rem 36
1100 DATA 2,3,4,7,5,9,10,19,13,25,11,21,1
     4,27,1,3,5,8,11,20              :rem 28
1105 DATA 14,26,2,1,6,9,5,7,12,21,15,27,1
     4,25,11,19,5,6                  :rem 112
1110 DATA 14,24,13,22,1,7,1,9,2,8,3,7,4,6
     ,14,23,15,24                    :rem 2
1115 DATA 3,9,14,22,4,5,1,4,3,5,8,9,16,25
     ,13,19,17,27,14,21              :rem 55
1120 DATA 7,9,2,5,17,26,14,20,1,5,3,6,7,8
     ,18,27,15,21,17,25,14,19        :rem 95
1125 DATA 11,12,13,16,14,18,1,19,10,12,14
     ,17,2,20,3,19,1,21              :rem 30
1130 DATA 14,16,15,18,10,11,3,21,10,16,14
     ,15                             :rem 74
1135 DATA 4,22,1,25,7,19,10,18,11,17,12,1
     6,13,15,2,26                    :rem 11
1140 DATA 1,27,3,25,4,24,6,22,7,21,8,20,9
     ,19,12,18                       :rem 127
1145 DATA 13,14,6,24,3,27,9,21,10,13,18,1
     7,12,14,7,25                    :rem 18
1150 DATA 11,14,16,18,8,26,9,25,7,27,12,1
     5,10,14,16,17                   :rem 74
1155 DATA 9,27,20,21,22,25,23,27,1,10,9,1
     4,7,13,3,11                     :rem 218
1160 DATA 23,26,2,11,8,14,19,21,19,20,27,
     24,23,25                        :rem 80
1165 DATA 12,3,9,15,7,14,1,11,19,25,23,24
     ,4,13,6,14                      :rem 174
1170 DATA 19,27,20,26,21,25,22,24,5,14,22
     ,23,21,27                       :rem 127
1175 DATA 6,15,4,14,23,21,26,27,19,22,7,1
     6,1,13,9,17                     :rem 236
```

```
1180 DATA 3,14,20,23,25,27,8,17,2,14,19,2
     3,21,24,25,26                    :rem 69
1185 DATA 9,18,3,15,7,17,1,14         :rem 141
```

Program 2:

3-D Tic-Tac-Toe—VIC Version

Memory expansion (any amount) required.

```
100 PRINT"{CLR}":POKE36879,15:DIMP(27)
                                      :rem 31
110 DIMDI(28):FORI=1TO27:READX1:X2=X2+X1:
    DI(I+1)=X2:NEXTI:DI(1)=0          :rem 178
120 DD=37154:P1=37151:P2=37152        :rem 80
130 PRINT"{RED}{3 SPACES}{RVS}£
    {5 SPACES}{OFF}{2 SPACES}{RVS}
    {5 SPACES}£*£"                    :rem 191
140 PRINT"{2 SPACES}{RVS}£{7 SPACES}
    {OFF} {RVS}{6 SPACES}£*£"         :rem 164
150 PRINT" {RVS}£{8 SPACES}{OFF} {RVS}
    {7 SPACES}£*£"                    :rem 165
160 PRINT"{BLU}{RVS}£{6 SPACES}{RED}
    {3 SPACES}{OFF} {RVS}{2 SPACES}{BLU}
    {6 SPACES}£*£"                     :rem 0
170 PRINT"{RVS}{8 SPACES}{RED}{2 SPACES}
    {OFF} {RVS}{2 SPACES}{BLU}{7 SPACES}
    £*£"                              :rem 57
180 PRINT"{RVS}{2 SPACES}{RED}{OFF}£
    {2 SPACES}{RVS}£{BLU}{2 SPACES}{RED}
    {2 SPACES}{OFF} {RVS}{2 SPACES}{BLU}
    {2 SPACES}{OFF}{2 SPACES}{RVS}{RED}
    {2 SPACES}{BLU}{2 SPACES}"        :rem 107
190 PRINT"{4 SPACES}{RVS}{RED}£ {BLU}
    {2 SPACES}{RED}{2 SPACES}{OFF} {RVS}
    {2 SPACES}{BLU}{2 SPACES}{OFF}
    {2 SPACES}{RVS}{RED}{2 SPACES}{BLU}
    {2 SPACES}"                       :rem 31
200 PRINT"{3 SPACES}{RVS}{RED}£
    {2 SPACES}{BLU}{2 SPACES}{RED}
    {2 SPACES}{OFF} {RVS}{2 SPACES}{BLU}
    {2 SPACES}{OFF}{2 SPACES}{RVS}{RED}
    {2 SPACES}{BLU}{2 SPACES}"        :rem 23
210 PRINT"{3 SPACES}{RVS}{5 SPACES}{RED}
    {2 SPACES}{OFF} {RVS}{2 SPACES}{BLU}
    {2 SPACES}{OFF}{2 SPACES}{RVS}{RED}
    {2 SPACES}{BLU}{2 SPACES}"        :rem 52
220 PRINT"{3 SPACES}{RVS}{5 SPACES}{RED}
    {2 SPACES}{OFF} {RVS}{2 SPACES}{BLU}
    {2 SPACES}{OFF}{2 SPACES}{RVS}{RED}
    {2 SPACES}{BLU}{2 SPACES}"        :rem 53
230 PRINT"{2 SPACES}{RVS}{RED}£
    {3 SPACES}{BLU}{2 SPACES}{RED}
    {2 SPACES}{OFF} {RVS}{2 SPACES}{BLU}
    {2 SPACES}{OFF}{2 SPACES}{RVS}{RED}
    {2 SPACES}{BLU}{2 SPACES}"        :rem 26
240 PRINT" {RVS}{RED}£{4 SPACES}{BLU}
    {2 SPACES}{RED}{2 SPACES}{OFF} {RVS}
    {2 SPACES}{BLU}{2 SPACES}{RED}
    {4 SPACES}{BLU}{2 SPACES}"        :rem 119
250 PRINT"{RVS}{RED}£{5 SPACES}{BLU}
    {2 SPACES}{RED} {OFF}£ {RVS}
    {2 SPACES}{BLU}{2 SPACES}{RED}
    {4 SPACES}{BLU}{2 SPACES}"        :rem 33
260 PRINT"{RVS}{2 SPACES}{RED}{4 SPACES}
    {BLU}{2 SPACES}{RED}{OFF}£{2 SPACES}
    {RVS}{2 SPACES}{BLU}{2 SPACES}{RED}
    {4 SPACES}{BLU}{2 SPACES}"        :rem 121
270 PRINT"{RVS}{7 SPACES}{OFF}£
    {3 SPACES}{RED}£*£{RVS} {BLU}
    {7 SPACES}{OFF}£"                 :rem 30
280 PRINT"£*£{RVS}{5 SPACES}{OFF}£
    {5 SPACES}{RED}£*£{RVS}{BLU}
    {6 SPACES}{OFF}£"                 :rem 254
290 PRINT"{DOWN}{CYN}T I C{RED} C {CYN}T
    {SPACE}A C{RED} C{CYN} T O E":rem 184
300 PRINTTAB(2)"{DOWN}£3FIREBUTTON TO PL
    AY"                               :rem 64
310 POKEDD,255:P=PEEK(P1):IF -((PAND32)=0
    )<>1 THEN 310                     :rem 204
320 PRINT"{CLR}£6";:POKE36879,10:O=1
                                      :rem 203
325 H=256*PEEK(648):PH=30720:IFPEEK(648)=
    16THENPH=33792                    :rem 154
330 CU=32:CC=0:S=36874:VO=36878        :rem 255
340 POKES+13,240                      :rem 106
350 P(1)=31+H:P(2)=34+H:P(3)=37+H:P(4)=77
    +H:P(5)=80+H:P(6)=83+H:P(7)=123+H
                                      :rem 163
360 P(8)=126+H:P(9)=129+H:P(10)=207+H
                                      :rem 160
370 P(11)=210+H:P(12)=213+H:P(13)=253+H:P
    (14)=256+H:P(15)=259+H             :rem 11
380 P(16)=299+H:P(17)=302+H:P(18)=305+H:P
    (19)=383+H:P(20)=386+H:P(21)=389+H
                                      :rem 190
390 P(22)=429+H:P(23)=432+H:P(24)=435+H:P
    (25)=475+H:P(26)=478+H:P(27)=481+H
                                      :rem 191
400 FORD=1TO2:PRINT"PLAYER #";D;:INPUTPL$
    (D):NEXT:CO(1)=4:CO(2)=5          :rem 207
410 FORV=1TO2:PL$(V)=LEFT$(PL$(V),8):NEXT
                                      :rem 215
420 M(2)=87:M(1)=86:L=1               :rem 186
430 INPUT"HOW MANY ROUNDS";RD          :rem 58
450 PRINT"{CLR}{RED}";:FORV=1TO3       :rem 15
460 PRINT"{7 SPACES}£9 @£"             :rem 47
470 PRINTTAB(6)"{RVS}£*£{OFF}{2 SPACES}M
    {2 SPACES}M{2 SPACES}M"           :rem 180
480 PRINTTAB(6)"£*£{RVS}£*£{OFF}£@£ M£@£
    {SPACE}M£@£ M"                    :rem 128
490 PRINTTAB(7)"£*£{RVS}£*£{OFF}£2 T£M
    £2 T£M£2 T£M"                     :rem 104
500 PRINTTAB(8)"£*£{RVS}£*£{OFF}£@£ M£@£
    {SPACE}M£@£ M"                    :rem 123
510 PRINTTAB(9)"£*£{RVS}£*£{OFF}£2 T£M
    £2 T£M£2 T£M"                      :rem 99
520 PRINTTAB(10)"£*£{RVS}£*£{OFF}
    {2 SPACES}M{2 SPACES}M{2 SPACES}M"
                                      :rem 186
530 PRINTTAB(11)"£*£{RVS}{9 SPACES}{OFF}"
    ;                                 :rem 177
540 ONVGOTO550,560,570                :rem 238
550 PRINT"{BLU}";:NEXT                 :rem 62
560 PRINT"{GRN}";:NEXT                 :rem 62
570 R=1                                :rem 92
580 POKEP(O),160:POKEP(O)+PH,2        :rem 249
590 PRINT"{HOME}{4 DOWN}{YEL}ROUND:£6";R
                                      :rem 76
600 PRINT"{HOME}{6 DOWN}";:FORV=1TO11:PRI
    NT" ";:NEXTV                      :rem 26
605 PRINT"{HOME}{5 DOWN}":PRINTPL$(L);"'S
    ":PRINT"TURN"                     :rem 69
610 POKEDD,127:P=PEEK(P2)AND128:J1=-(P=0)
                                      :rem 110
620 POKEDD,255:P=PEEK(P1):J2=-((PAND16)=0
    )                                 :rem 142
630 IFJ1=1THENPP=1:GOTO660             :rem 93
640 IFJ2=1THENPP=-1:GOTO680           :rem 142
650 GOTO760                           :rem 113
660 IFO=27THENO=26:NX=CU:NC=CC:GOTO710
                                      :rem 145
670 NX=PEEK(P(O+1)):NC=PEEK(P(O+1)+PH):GO
    TO700                             :rem 217
680 IFO=1THENO=2:NX=CU:NC=CC:GOTO710
                                      :rem 37
```

```
690 NX=PEEK(P(O-1)):NC=PEEK(P(O-1)+PH)
                                    :rem 213
700 POKEP(O),CU:POKEP(O)+PH,CC      :rem 72
710 O=O+PP                          :rem 62
720 CU=NX:CC=NC                     :rem 162
730 POKEP(O),160:POKEP(O)+PH,1      :rem 245
740 POKEVO,15:POKES,170             :rem 129
750 FORD=1TO20:NEXT:POKEVO,0:GOTO770
                                    :rem 46
760 FORD=1TO15:NEXT                 :rem 184
770 POKEP(O),CU:POKEP(O)+PH,CC:FORD=1TO45
    :NEXT:POKEP(O),160:POKEP(O)+PH,1
                                    :rem 60
780 POKEDD,255:P=PEEK(P1):J= -((PAND32)=0
    ):IFJ<>1THEN610                 :rem 229
790 IFCU=32THEN820                  :rem 50
800 POKEVO,15:POKES,160             :rem 125
810 FORD=1TO500:NEXT:POKEVO,0:GOTO610
                                    :rem 87
820 POKEP(O),M(L):POKEP(O)+PH,CO(L):CU=M(
    L):CC=CO(L)                     :rem 107
830 POKEVO,15:POKES,200             :rem 123
840 FORD=1TO250:NEXT:POKEVO,0       :rem 82
850 A=0:B=0:C=0                     :rem 30
860 RESTORE:READX:FOR I=1TODI(O)+13:READX
    ,Y:NEXTI                        :rem 156
870 FORI=DI(O)+1TODI(O+1)           :rem 193
880 READ X,Y:IF(PEEK(P(X))=M(L))AND(PEEK(
    P(Y))=M(L))THEN B=X:C=Y:A=O     :rem 36
890 NEXTI                           :rem 41
900 IFA=0THEN1010                   :rem 199
910 PRINT"{HOME}{14 DOWN}{10 SPACES}"
                                    :rem 108
920 PRINT"{HOME}{14 DOWN}";PL$(L):PRINT"W
    INS!";                          :rem 173
930 SC(L)=SC(L)+1                   :rem 155
940 T=255:POKEVO,15:POKES,133::FORX=1TO10
                                    :rem 14
950 H=INT(16*RND(1))                :rem 86
960 POKEP(A)+PH,H                   :rem 231
970 POKEP(B)+PH,H                   :rem 233
980 POKEP(C)+PH,H                   :rem 235
990 POKES,T:FORD=1TO350:NEXT:T=T-26:NEXT:
    POKES,160:POKEVO,0:GOTO1000     :rem 117
1000 FORO=1TO27:POKEP(O),32:POKEP(O)+PH,0
     :NEXT                          :rem 76
1010 IFL=1THENL=2:GOTO1030          :rem 44
1020 L=1                            :rem 125
1030 IFA=0THEN590                   :rem 206
1040 CU=32:CC=0:NX=0:NC=0:O=1       :rem 168
1050 R=R+1:IFR>RDTHEN1070           :rem 233
1060 PRINT"{HOME}{14 DOWN}{11 SPACES}":PR
     INT"{5 SPACES}":GOTO590        :rem 181
1070 PRINT"{CLR}{7 DOWN}{17 SPACES}"
                                    :rem 163
1080 PRINT"{3 DOWN}FINAL SCORE"     :rem 179
1090 PRINT"{YEL}{11 Y}{GRN}"        :rem 52
1100 PRINTPL$(1);":";SC(1)          :rem 157
1110 PRINTPL$(2);":";SC(2)          :rem 160
1120 PRINT"{DOWN}FIREBUTTON TO PLAY
     {4 SPACES}AGAIN,(E) TO END"    :rem 29
1125 POKEDD,255:P=PEEK(P1)          :rem 6
1128 GET XX$:IF XX$="E" THEN END :rem 233
1129 IF -((PAND32)=0)<>1 THEN 1125
                                    :rem 195
1130 POKE198,0:RUN                  :rem 33
1140 DATA 7,4,7,4,5,4,7,4,7,4,5,4,5,12,5,
     4,5,4,7,4,7,4,5,4,7,4,7        :rem 33
1150 DATA 2,3,4,7,5,9,10,19,13,25,11,21,1
     4,27,1,3,5,8,11,20             :rem 33
1160 DATA 14,26,2,1,6,9,5,7,12,21,15,27,1
     4,25,11,19,5,6                 :rem 113
1170 DATA 14,24,13,22,1,7,1,9,2,8,3,7,4,6
     ,14,23,15,24                   :rem 8
1180 DATA 3,9,14,22,4,5,1,4,3,5,8,9,16,25
     ,13,19,17,27,14,21             :rem 57
1190 DATA 7,9,2,5,17,26,14,20,1,5,3,6,7,8
     ,18,27,15,21,17,25,14,19       :rem 102
1200 DATA 11,12,13,16,14,18,1,19,10,12,14
     ,17,2,20,3,19,1,21             :rem 24
1210 DATA 14,16,15,18,10,11,3,21,10,16,14
     ,15                            :rem 73
1220 DATA 4,22,1,25,7,19,10,18,11,17,12,1
     6,13,15,2,26                   :rem 6
1230 DATA 1,27,3,25,4,24,6,22,7,21,8,20,9
     ,19,12,18                      :rem 127
1240 DATA 13,14,6,24,3,27,9,21,10,13,18,1
     7,12,14,7,25                   :rem 14
1250 DATA 11,14,16,18,8,26,9,25,7,27,12,1
     5,10,14,16,17                  :rem 75
1260 DATA 9,27,20,21,22,25,23,27,1,10,9,1
     4,7,13,3,11                    :rem 215
1270 DATA 23,26,2,11,8,14,19,21,19,20,27,
     24,23,25                       :rem 82
1280 DATA 12,3,9,15,7,14,1,11,19,25,23,24
     ,4,13,6,14                     :rem 172
1290 DATA 19,27,20,26,21,25,22,24,5,14,22
     ,23,21,27                      :rem 130
1300 DATA 6,15,4,14,23,21,26,27,19,22,7,1
     6,1,13,9,17                    :rem 226
1310 DATA 3,14,20,23,25,27,8,17,2,14,19,2
     3,21,24,25,26                  :rem 64
1320 DATA 9,18,3,15,7,17,1,14       :rem 132
```

Shape Match For VIC And 64

VIC users must have at least 8K memory expansion.
See article on page 84.

```
50 REM **{11 SPACES}INITIALIZE{7 SPACES}*
   *                                :rem 227
52 DIM CL(20,40)                    :rem 19
53 PRINT"{CLR}{BLU}":SYS65517:WI=PEEK(781
   ):IFWI=22THENWI=0:POKE36879,238:SS=2:P
   H=.5                             :rem 163
54 IF WI=0THENAA$="VIC":BB$="VIC":GOTO60
                                    :rem 91
55 POKE53280,1:POKE53281,15:SS=12:WI=8:PH
   =1                               :rem 5
57 AA$="64{DOWN}{22 LEFT}":BB$="64"
                                    :rem 89
60 IF WI=0 THEN CL(4,18)=1:CL(4,31)=2:CL(
   10,18)=3:CL(10,31)=4:GOTO80      :rem 108
63 FORA=6TO12STEP6:FORB=17TO33STEP16:S=64
   6:POKES,SS                       :rem 40
70 T=T+1:CL(A,B)=T:NEXTB,A          :rem 42
80 PRINT"{6 DOWN}";:PRINTTAB(WI+5)"{BLK}S
   HAPE MATCH"                      :rem 123
190 GOSUB3000:REM **{2 SPACES}INSTRUCTION
    S{3 SPACES}**                   :rem 88
200 GOSUB1000:REM ** PRINT BOARD **
                                    :rem 142
210 FORT=1TO1000:NEXT               :rem 25
300 REM ******************************
                                    :rem 141
302 REM **{8 SPACES}SELECT SHAPES
    {6 SPACES}**                    :rem 165
305 REM ******************************
                                    :rem 146
```

```
306 K=RND(-TI)                          :rem 32
310 K=INT(RND(0)*4)+1:IFK=KKTHEN310
                                        :rem 33
320 REM                                 :rem 121
340 FORT=1TO3:GOSUB2000:BO$=SH$(T):A=4+T:
    B=18:PRINT"{HOME}":GOSUB1170:NEXT T
                                        :rem 29
345 GOSUB1180:REM **{6 SPACES}DELAY
    {6 SPACES}**                        :rem 27
348 IFWI=0THENFORT=1TO3:GOSUB2100:BO$=SH$
    (T):A=4+T:B=32:PRINT"{HOME}"  :rem 157
349 IFWI=0THENGOSUB1170:NEXTT:GOTO355
                                        :rem 145
350 FORT=1TO3:GOSUB2100:BO$=SH$(T):A=4+T:
    B=28:PRINT"{HOME}":GOSUB1170:NEXT T
                                        :rem 32
355 GOSUB1180                           :rem 231
360 FORT=1TO3:GOSUB2200:BO$=SH$(T):A=10+T
    :B=18:PRINT"{HOME}":GOSUB1170:NEXT T
                                        :rem 78
365 GOSUB1180                           :rem 232
370 FORT=1TO3:GOSUB2300:BO$=SH$(T):A=10+T
    :B=28:PRINT"{HOME}":GOSUB1170:NEXT T
                                        :rem 81
375 GOSUB1180                           :rem 233
380 FORT=1TO3                           :rem 26
383 ONKGOSUB2000,2100,2200,2300  :rem 152
385 BO$=SH$(T):A= 8+T:B=3:PRINT"{HOME}":G
    OSUB1170:NEXT T:KK=K                :rem 23
500 REM                                 :rem 121
550 REM END                             :rem 85
600 REM *******************************
                                        :rem 144
602 REM **{10 SPACES}MOVE CURSOR
    {6 SPACES}**                        :rem 57
604 REM *******************************
                                        :rem 148
605 PRINT"{HOME}":C=1:FORNT=1TO10:rem 159
610 FORT=1TO15:BO$=CHR$(63):IFT/2=INT(T/2
    )THEN BO$=CHR$(18)+CHR$(63)+CHR$(146)
                                        :rem 182
613 IF WI=0THEN ON C GOTO 660,673,683,687
                                        :rem 132
615 ONC GOTO670,675,680,685             :rem 185
620 GOSUB1170:PRINT"{HOME}":FORTT=1TO 75:
    {8 SPACES}NEXTTT:GOTO700      :rem 112
625 NEXT T                              :rem 48
630 BO$=CHR$(32):GOSUB1170:PRINT"{HOME}":
    {8 SPACES}FORTT=1TO 75:NEXTTT:C=C+1
                                        :rem 163
640 IFC>4THENC=1                        :rem 190
650 NEXTNT:GOTO600:REM **{2 SPACES}REPEAT
    {2 SPACES}**                        :rem 12
660 A=4:B=18:L=1:GOTO620                :rem 111
670 A=6:B=17:L=1:GOTO620                :rem 113
673 A=10:B=18:L=2:GOTO620               :rem 161
675 A=12:B=17:L=2:GOTO620               :rem 164
680 A=6:B=33:L=3:GOTO620                :rem 114
683 A=4:B=31:L=3:GOTO620                :rem 113
685 A=12:B=33:L=4:GOTO620               :rem 165
687 A=10:B=31:L=4:GOTO620               :rem 163
700 REM *******************************
                                        :rem 145
702 REM **{5 SPACES}CHECK FOR RESPONSE
    {4 SPACES}**                        :rem 217
704 REM *******************************
                                        :rem 149
710 GETA$:IFA$=""THEN 625               :rem 88
715 IF A$="Q"THEN PRINT"{CLR}":END :rem 7
720 IFCL(A,B)=K THEN800:REM CORRECT
                                        :rem 54
740 GOTO850: REM **{2 SPACES}WRONG
    {4 SPACES}**                        :rem 196
800 REM *******************************
                                        :rem 146
802 REM **{9 SPACES}CORRECT ANSWER
    {4 SPACES}**                        :rem 8
804 REM *******************************
                                        :rem 150
810 BO$="{RVS}{WHT}YES! THAT'S RIGHT!":A=
    18:GOSUB1174:PRINT"{HOME}"          :rem 8
820 BO$="{5}{RVS}{BLK} PRESS ANY KEY
    {WHT}{OFF}":A=20:GOSUB1174:PRINT"
    {HOME}"                             :rem 190
825 GETA$:IFA$=""THEN825                :rem 97
830 FORA=1TO23:BO$="{40 SPACES}":B=0:GOSU
    B1170                               :rem 21
835 PRINT"{HOME}":NEXT                  :rem 253
840 GOTO200:REM **{2 SPACES}RE-PRINT BOAR
    D{2 SPACES}**                       :rem 230
850 REM *******************************
                                        :rem 151
852 REM **{11 SPACES}WRONG ANSWER
    {4 SPACES}**                        :rem 136
854 REM *******************************
                                        :rem 155
855 BO$=CHR$(32):GOSUB1170:PRINT"{HOME}"
                                        :rem 236
860 BO$="{RVS}{5}{BLK}SORRY...TRY AGAIN
    ...{WHT}{OFF}":{7 SPACES}A=18:B=10:GO
    SUB1174:PRINT"{HOME}"               :rem 151
865 FORW=1TO1000:NEXT                   :rem 44
870 BO$="{22 SPACES}":A=18:{6 SPACES}B=10
    :GOSUB1174:PRINT"{HOME}"            :rem 181
875 C=C+1:IFC>4THENC=1                  :rem 33
880 GOTO 625                            :rem 118
999 REM{2 SPACES}************************
    ******                              :rem 123
1000 PRINT"{CLR}{BLU}"                  :rem 68
1015 IFWI=0THENBO$=" {RVS}{A}*****{R}****
    *{S}":A=3:B=15:GOSUB1170:PRINT"{HOME}
    ":GOTO1030                          :rem 76
1020 A=3:B=15:BO$="{RVS}{A}*********{R}**
    *******{S}{OFF}":GOSUB1170:PRINT"{HO
    ME}"                                :rem 216
1025 REM                                :rem 172
1030 FORT=1TO5:A=3+T:B=15                :rem 206
1035 IF WI=0THENBO$=" {RVS}-{OFF}
    {5 SPACES}{RVS}-{OFF}{5 SPACES}{RVS}
    -{OFF}":GOSUB1170:PRINT"{HOME}":GOTO
    1045                                :rem 43
1040 BO$="{RVS}B{OFF}{9 SPACES}{RVS}B
    {OFF}{9 SPACES}{RVS}B{OFF}":GOSUB117
    0:PRINT"{HOME}"                     :rem 206
1045 NEXT T                             :rem 93
1047 IFWI=0THENA=9:B=15:BO$=" {RVS}{Q}***
    **+*****{W}{OFF}":GOSUB1170:PRINT"{H
    OME}":GOTO1060                      :rem 21
1050 A=9:B=15:BO$="{RVS}{Q}*********+****
    *****{W}{OFF}":GOSUB1170:PRINT"{HOME
    }"                                  :rem 10
1060 FORT=1TO5:A=9+T:B=15                :rem 215
1065 IFWI=0THENBO$=" {RVS}-{OFF}
    {5 SPACES}{RVS}-{OFF}{5 SPACES}{RVS}
    -{OFF}":GOSUB1170:PRINT"{HOME}":GOTO
    1073                                :rem 47
1070 BO$="{RVS}B{OFF}{9 SPACES}{RVS}B
    {OFF}{9 SPACES}{RVS}B{OFF}":GOSUB117
    0:PRINT"{HOME}"                     :rem 209
1073 NEXTT                              :rem 94
```

```
1078 A=15:B=15:IFWI=0THENBO$=" {RVS}{Z}**
     ***{E}*****{X}{OFF}":GOSUB1170:PRINT"
     {HOME}":GOTO1090                  :rem 43
1080 BO$="{RVS}{Z}*********{E}*********
     {X}{OFF}":GOSUB1170:PRINT"{HOME}"
                                       :rem 223
1090 BO$=T$:A=20:B=13:GOSUB1170:PRINT"
     {HOME}"                           :rem 12
1093 PRINTTAB(WI)"{2 SPACES}TYPE (Q) TO Q
     UIT.{HOME}"                       :rem 113
1095 RETURN                            :rem 175
1100 REM ***************************+***
                                       :rem 147
1110 REM **{11 SPACES}PRINT{10 SPACES}**
                                       :rem 220
1111 REM ******************************
                                       :rem 148
1170 FORI=1TOA:PRINT"{DOWN}";:NEXT:PRINTT
     AB(B*PH)BO$:RETURN                :rem 221
1174 FORI=1TOA:PRINT"{DOWN}";:NEXT:PRINTT
     AB(WI)BO$:RETURN                  :rem 125
1175 REM                               :rem 178
1180 FORX=1TO500:NEXT:RETURN            :rem 66
2000 REM                               :rem 166
2015 SH$(1)="{RED} {RVS}{3 U}" :rem 224
2020 SH$(2)=" {RVS}{3 SPACES}"         :rem 153
2025 SH$(3)=" {RVS}{3 SPACES}{WHT}":RETUR
     N                                 :rem 190
2100 REM                               :rem 167
2115 SH$(1)="{PUR}{RVS}{RIGHT} {RIGHT}"
                                       :rem 115
2120 SH$(2)="{RVS}{3 SPACES}"          :rem 154
2125 SH$(3)="{RVS}{RIGHT} {RIGHT}{WHT}":R
     ETURN                             :rem 249
2200 REM                               :rem 168
2215 SH$(1)="{BLK}{RVS}{3 RIGHT}£"
                                        :rem 46
2220 SH$(2)="{RVS}{2 RIGHT}£ "         :rem 126
2225 SH$(3)="{RVS}{RIGHT}£{2 SPACES}
     {WHT}":RETURN                     :rem 134
2300 REM                               :rem 169
2315 SH$(1)="{BLU}{RVS}{2 RIGHT}£{*}
     {RIGHT}"                          :rem 157
2320 SH$(2)="{RVS}{RIGHT}£{2 SPACES}
     {*}"                              :rem 65
2325 IFWI=8THENSH$(3)="{RVS}£{4 SPACES}
     {*}":RETURN                       :rem 23
2330 SH$(3)="":RETURN                  :rem 166
3000 PRINT"{4 DOWN}";:PRINTTAB(WI)"
     {2 SPACES}INSTRUCTIONS (Y/N) ?"
                                         :rem 1
3020 GETA$:IFA$=""THEN3020             :rem 173
3030 IFA$="N"THEN3200                  :rem 125
3040 IFA$="Y"THENPRINT"{CLR}":GOTO 3100
                                        :rem 95
3050 GOTO3020                          :rem 198
3100 PRINTTAB(WI)"IN SHAPE MATCH,THE "AA$
     ;:PRINTTAB(WI)"WILL PRINT A SHAPE ON
     "                                 :rem 167
3110 PRINTTAB(WI)"THE LEFT SIDE OF THE":P
     RINTTAB(WI)"SCREEN. THE STUDENT"
                                       :rem 206
3115 PRINTTAB(WI)"WILL FIND 4 DIFFERENT":
     PRINTTAB(WI)"SHAPES ON THE RIGHT"
                                        :rem 26
3120 PRINTTAB(WI)"SIDE OF THE SCREEN,":PR
     INTTAB(WI)"ONE OF WHICH WILL"
                                       :rem 219
3130 PRINTTAB(WI)"MATCH THE SHAPE ON":PRI
     NTTAB(WI)"THE LEFT."              :rem 201
3140 PRINTTAB(WI)"WHEN THE {RVS}?{OFF} IS
     ":PRINTTAB(WI)"NEXT TO THE SHAPE HE"
                                       :rem 135
3150 PRINTTAB(WI)"OR SHE THINKS IS":PRINT
     TAB(WI)"CORRECT, THE STUDENT"
                                       :rem 105
3155 PRINTTAB(WI)"SHOULD PRESS ANY KEY."
                                       :rem 194
3156 PRINTTAB(WI)"THE ";BB$;" WILL EVALUA
     TE"                               :rem 58
3160 PRINTTAB(WI)"THE ANSWER AND LET":PRI
     NTTAB(WI)"THE STUDENT KNOW HOW"
                                       :rem 212
3165 PRINTTAB(WI)"HE DID. TYPE {RVS}Q
     {OFF} TO":PRINTTAB(WI)"END THE PROGR
     AM.{DOWN}"                        :rem 176
3190 PRINTTAB(WI)"PRESS ANY KEY TO PLAY";
                                       :rem 216
3195 GETA$:IFA$=""THEN3195             :rem 199
3196 PRINT"{CLR}{WHT}"CHR$(142)         :rem 37
3200 RETURN                            :rem 165
```

The Frantic Fisherman

See special instructions in article on page 58.

BEFORE TYPING...

Before typing in programs, please refer to "How To Type COMPUTE!'s Gazette Programs," "A Beginner's Guide To Typing In Programs," and "The Automatic Proofreader" that appear before the Program Listings.

Program 1:

The Frantic Fisherman—Redefined Characters, VIC Version

```
1 PRINT"{CLR}{3 DOWN}{2 SPACES}FRANTIC
  {2 SPACES}FISHERMAN"               :rem 108
2 PRINT"{4 DOWN} LOADING CHARACTERS.."
                                     :rem 129
10 FORT=7168TO7168+62*8-1:READA:POKET,A:N
   EXT                               :rem 181
20 DATA14,62,254,62,14,2,6,6        :rem 131
30 DATA14,14,14,22,22,22,54,54      :rem 222
40 DATA118,118,246,254,246,246,246,246
                                     :rem 141
50 DATA0,0,0,1,1,3,7,7               :rem 70
60 DATA246,246,246,254,246,246,246,246
                                     :rem 147
70 DATA15,31,63,127,255,255,255,255
                                     :rem 242
80 DATA0,0,0,0,0,3,7,31              :rem 116
90 DATA246,246,6,254,254,6,6,15     :rem 45
100 DATA255,255,8,255,255,0,0,0     :rem 23
110 DATA127,127,64,255,255,0,0,0    :rem 70
120 DATA255,255,127,127,63,31,15,7
                                     :rem 183
130 DATA170,255,85,0,255,85,0,170:rem 132
140 DATA255,255,254,254,252,248,240,224
                                     :rem 182
150 DATA6,12,24,240,192,0,0,0       :rem 165
160 DATA0,0,0,192,240,24,12,6       :rem 166
170 DATA96,48,24,15,3,0,0,0          :rem 80
180 DATA0,0,0,3,15,24,48,96          :rem 81
190 DATA40,40,170,60,28,252,12,60:rem 122
200 DATA12,40,40,248,248,40,20,40:rem 113
210 DATA40,40,170,60,52,63,48,60    :rem 73
```

```
220 DATA48,40,40,47,47,40,20,40    :rem 22
230 DATA32,48,190,187,252,255,190,128
                                   :rem 88
240 DATA4,12,125,221,63,255,125,1:rem 118
250 DATA0,0,0,0,0,0,7,195          :rem 219
260 DATA0,0,0,0,1,13,109,255       :rem 113
270 DATA0,0,0,0,128,224,248,248    :rem 22
280 DATA0,0,0,0,1,15,15,15         :rem 11
290 DATA7,3,15,63,255,255,255,255:rem 146
300 DATA199,255,255,255,255,255,255,255
                                   :rem 200
310 DATA255,255,255,255,255,255,255,255
                                   :rem 194
320 DATA0,192,240,240,224,248,252,248
                                   :rem 72
330 DATA255,7,31,127,3,24,31,31    :rem 22
340 DATA0,0,0,0,0,0,0,0            :rem 101
350 DATA255,255,255,255,255,127,255,255,0
    ,0,0,0,0,0,0,0                 :rem 164
360 DATA255,255,255,255,252,255,255,224
                                   :rem 192
370 DATA255,192,240,252,0,0,128,0:rem 122
380 DATA0,0,63,0,0,0,0,0           :rem 162
390 DATA3,3,193,1,1,1,0,0          :rem 224
400 DATA0,0,0,0,0,3,12,0           :rem 152
410 DATA0,0,0,48,192,0,0,0          :rem 11
420 DATA127,127,63,63,31,15,7,3    :rem 30
430 DATA1,2,4,8,16,32,64,128       :rem 133
440 DATA0,0,0,0,4,4,8,8            :rem 126
450 DATA255,127,31,7,0,0,0,4       :rem 124
460 DATA16,16,32,32,0,0,0,0         :rem 64
470 DATA4,4,4,4,4,4,4,0            :rem 133
475 DATA255,199,189,207,245,143,255,255
                                   :rem 211
480 DATA255,129,145,169,169,169,145,255
                                   :rem 210
490 DATA255,129,145,177,145,145,185,255
                                   :rem 202
500 DATA255,129,153,165,137,145,189,255
                                   :rem 195
510 DATA255,129,185,137,153,137,185,255
                                   :rem 195
520 DATA255,129,153,169,189,137,137,255
                                   :rem 202
530 DATA255,129,189,161,185,133,185,255
                                   :rem 199
540 DATA255,129,157,161,185,165,153,255
                                   :rem 195
550 DATA255,129,189,133,137,145,145,255
                                   :rem 196
560 DATA255,129,153,165,153,165,153,255
                                   :rem 192
570 DATA255,129,153,165,157,133,185,255
                                   :rem 197
580 DATA20,58,28,119,8,54,8,54       :rem 1
590 DATA8,8,28,20,58,62,62,28      :rem 207
600 DATA28,62,127,73,8,8,40,16     :rem 245
610 DATA16,2,32,136,80,42,116,56    :rem 78
620 REM LOWER MEMORY 512 BYTES     :rem 253
630 POKE52,PEEK(52)-2:POKE56,PEEK(56)-2
                                   :rem 215
```

Program 2:

The Frantic Fisherman—Main Program, VIC Version

```
10 CL$="{WHT}WXY{5 LEFT}{DOWN}Z[ff]↑
   {5 LEFT}{DOWN}←!#$"             :rem 213
20 DEF FNRN(X)=INT(RND(1)*X)       :rem 111
30 V=36878:NO=V-1:S=V-2:S2=V-3:S3=V-4:CO=
   30720:EG=2000:TT=22:T6=256:Z=32:DE=29
                                   :rem 63
40 GOTO7000                        :rem 100
100 GL=3:SC=.                      :rem 207
105 EG=2000                         :rem 33
110 POKE36869,255                  :rem 153
120 PRINT"{CLR}{11 RIGHT}{18 DOWN}{GRN}@
    {LEFT}{DOWN}{WHT}A{2 LEFT}{DOWN}CB
    {3 LEFT}{DOWN}FED{3 LEFT}{DOWN}IHG
    {4 LEFT}{DOWN}{RED}JKKKL";     :rem 84
130 POKE646,10:PRINT"{4 LEFT}KKK":PRINT"
    {CYN}]]]]]]]]]]]]]]]]]]]]{LEFT}
    {INST}]{HOME}{3 DOWN}":POKEV,15+16*9
                                   :rem 181
140 POKE36879,238                  :rem 158
150 PRINT"{HOME}{6 DOWN}{2 RIGHT}"CL$"
    {7 UP}{4 RIGHT}"CL$"{3 DOWN}{3 RIGHT}
    "CL$;                          :rem 235
160 PRINT"{YEL}{8 UP}%&]]{4 LEFT}{DOWN}'(
    )]{3 LEFT}{DOWN}*+,{2 LEFT}{DOWN}-."
                                   :rem 252
170 PRINT"{HOME}{BLK}/"SC;:POKE646,8:PRIN
    T"{HOME}{DOWN}";:IF GL>1THENFORT=1TOG
    L-1:PRINT"S";:NEXT             :rem 44
180 LO=8128:POKELO+CO,10:POKELO,18:POKELO
    -TT,17:POKELO-TT+CO,10:POKELO-1,15
                                   :rem 175
190 POKELO-1+CO,.:CL=LO-1:POKE8132+CO,10:
    POKE8110+CO,10:POKE8133+CO,.   :rem 37
200 TY=FNRN(2)+1:ONTYGOTO210,300 :rem 158
210 X=FNRN(2)+1:ONXGOTO220,230   :rem 248
220 BC=8142:EC=8149:SP=1:DD=21:GOTO240
                                   :rem 176
230 BC=8163:EC=8155:SP=-1:DD=22  :rem 214
240 FORDL=BCTOECSTEPSP:POKEDL,DD:POKEDL+C
    O,.                            :rem 150
250 GOSUB1000:POKEDL,Z:NEXT:IFSD<>196THEN
    3000                            :rem 60
260 SD=.:GOTO200                   :rem 159
300 NU=.:Y=59:C=6:X=FNRN(2)+1:ONXGOTO310,
    320                            :rem 110
310 B=7776:E=8084:GOTO330          :rem 135
320 B=7758:E=8088                  :rem 131
330 FORDL=BTOESTEPTT:POKEDL+CO,C:POKEDL,Y
    :GOSUB1000                     :rem 118
340 POKEDL,Z:NEXT:IFSP<>T6THEN3000
                                   :rem 183
350 SP=.:GOTO200                   :rem 171
1000 CK=PEEK(197):IFCK=64THENFORR=0TODE:N
     EXT:RETURN                     :rem 53
1010 IFCK=29ANDLO=8132THEN1500    :rem 245
1020 IFCK=37ANDLO=8128THEN1750      :rem 1
1030 IFCK=ZTHENONTYGOTO2000,3500 :rem 224
1040 RETURN                        :rem 165
1500 POKELO,Z:POKELO-TT,Z:POKECL,Z:LO=812
     8:CL=LO-1                     :rem 215
1510 POKELO,18:POKELO-TT,17:POKECL,15:FOR
     SD=130TO150STEP2:POKES2,SD:NEXT:POKE
     S2,.                          :rem 191
1520 RETURN                        :rem 168
1750 POKELO,Z:POKELO-TT,Z:POKECL,Z:LO=813
     2:CL=LO+1                     :rem 215
1760 POKELO,20:POKELO-TT,19:POKECL,13
                                   :rem 29
1770 FORSD=150TO130STEP-2:POKES2,SD:NEXT:
     POKES2,.:RETURN               :rem 126
2000 POKECL,PEEK(CL)+1:FORSD=250TO200STEP
     -10:POKENO,SD:NEXT:IFPEEK(CL+TT)=DDT
     HEN2100                       :rem 50
2010 POKECL,PEEK(CL)-1:POKENO,.:RETURN
                                   :rem 138
2100 SC=SC+75:PRINT"{HOME}{BLK}/"SC:GOSUB
     4000                          :rem 180
```

```
2110 POKEDL,58:FORSD=254TO198STEP-2:POKED
     L+CO,FNRN(8):POKENO,SD:NEXT :rem 109
2120 POKENO,.:GOTO2010            :rem 33
3000 GL=GL-1:FORT=130TO254STEP2:POKES,T:P
     OKENO,T:POKEV,15+FNRN(16)*16:NEXT
                                  :rem 170
3010 POKELO-TT,218:FORT=15TO0STEP-.2:POKE
     S,.:POKENO,160:POKEV,T+FNRN(16)*16:N
     EXT                          :rem 29
3020 IFGL=.THEN7000               :rem 72
3030 POKENO,.:GOTO120             :rem 242
3500 IFNU>2THENRETURN             :rem 121
3510 NU=NU+1:POKELO-44,60:POKELO-44+CO,4:
     FORSD=150TO180STEP10:POKES2,SD:NEXT:
     POKES2,.                     :rem 95
3520 IFPEEK(LO-66)=59THEN3600     :rem 166
3530 POKE(LO-44),Z:RETURN         :rem 27
3600 SC=SC+50:PRINT"{HOME}{BLK}/"SC:GOSUB
     4000:POKELO-66,61            :rem 227
3610 FORSP=200TO254STEP2:POKES,SP:NEXT:PO
     KES,.                        :rem 233
3620 POKELO-66,Z:RETURN           :rem 206
4000 IFSC>=EGTHENGL=GL+1:DE=DE-4:EG=EG+20
     00:POKE7700+GL,19:POKE7700+CO+GL,8:G
     OTO4020                      :rem 30
4010 RETURN                       :rem 165
4020 FORT=130TO230STEP10:FORR=T+10TOTSTEP
     -1:POKES,T:NEXTR,T:POKES,.:RETURN
                                  :rem 127
7000 POKE36869,240:PRINTCHR$(8):IFSC>HSTH
     ENHS=SC                      :rem 238
7010 POKE36879,8:POKE646,10:PRINT"{CLR}
     {3 SPACES}{A}**{S}":PRINT"{3 SPACES}
     -{A}*{X}"                    :rem 147
7020 PRINT"{3 SPACES}-{Z}{R}*{R}*{R}**{R}
     **{2 R}*{S}{6 SPACES}-{A}{W}{A}{W}
     {D}-{A}{S}{Q}{S}{A}{W}-{A}{X}
     {6 SPACES}-----{SHIFT-SPACE}--------
     {Z}{S}"                      :rem 2
7030 PRINT"{A}**+{X}{Q}{W}{Z}{2 E}{X}{Z}
     {X}{Z}{X}{Z}{E}*{X}":PRINT"-{A}*{X}
     {SPACE}--"                   :rem 11
7040 PRINT"-{Z}{2 R}*{W}{Z}*{R}*{R}*{R}**
     {R}*{R}**{S} -{A}{W}-*{W}{A}{S}-{V}-
     {A}{W}{2 SPACES}-{D}-{A}{S}-":rem 60
7050 PRINT"---{Q}*----*{W}----- ---- {Z}
     {X}{Z}{E}*{E}{X}{Z}{E}*{E}{X}{Z}
     {5 E}{X}{Z}{X}"              :rem 22
7060 PRINT"{DOWN}{RED}{2 SPACES}LAST SCOR
     E:"SC:PRINT"{DOWN}{GRN}{2 SPACES}HIG
     H SCORE:"HS                  :rem 246
7070 PRINT"{PUR}{DOWN}{2 SPACES}HIT A KEY
      TO PLAY"                    :rem 52
7080 PRINT"{RVS}{WHT}{7 SPACES}CONTROLS
     {7 SPACES}{OFF}{PUR}{4 SPACES}<-LEFT
     ":PRINT"{GRN}{4 SPACES}>-RIGHT"
                                  :rem 255
7090 PRINT"{RVS}{BLU}SPACE{OFF}-CLUB OR U
     MBRELLA":POKENO,.            :rem 120
7100 POKE36878,(FNRN(14)+2)*16:IFPEEK(197
     )=64THEN7100                 :rem 218
7110 GOTO100                      :rem 147
```

Program 3:

The Frantic Fisherman—64 Version

```
4 POKE56,60:CLR                   :rem 123
5 GOSUB 8000                      :rem 125
10 POKE 53280,0:POKE 53281,0      :rem 182
20 PRINT "{CLR}{N}{5}{DOWN} {A}*********
   {S}{3 SPACES}PRESS ANY KEY TO BEGIN"
                                  :rem 129
30 PRINT " -{9 SPACES}-"          :rem 238
40 PRINT "{SHIFT-SPACE}-{2 SPACES}{A}****
   **{X}{5 SPACES}HIGH SCORE:";HS :rem 75
50 PRINT "{SHIFT-SPACE}-{2 SPACES}{Z}****
   **{S}{5 SPACES}YOUR SCORE:";SC:rem 100
60 PRINT "{SHIFT-SPACE}-{9 SPACES}-"
                                  :rem 145
70 PRINT "{SHIFT-SPACE}-{2 SPACES}{A}****
   **+*****{R}*****{R}*****{R}*{R}****{S}
   "                              :rem 54
80 PRINT "{SHIFT-SPACE}-{2 SPACES}-
   {6 SPACES}-{5 SPACES}-{5 SPACES}-
   {5 SPACES}- -{4 SPACES}-"      :rem 193
90 PRINT "{SHIFT-SPACE}-{2 SPACES}- {A}**
   **{W}{2 SPACES}{U}{2 SPACES}- {A}*{S}
   {SPACE}{Q}*{S} {A}*{W} - {A}**{X}"
                                  :rem 176
100 PRINT "{SHIFT-SPACE}-{2 SPACES}- -
    {4 SPACES}- {A}*{S} - - - - - - - - -
    {Z}**{S}"                     :rem 87
110 PRINT " -{2 SPACES}- -{4 SPACES}- - -
     - - - - - - - -{4 SPACES}-"  :rem 86
120 PRINT "{A}{E}**{E}*{E}***{S}{Z}*{X}
    {Z}*{E}*{X} {Z}*{X} {Z}*{X} {Z}*{E}**
    **{X}"                        :rem 73
130 PRINT "-{9 SPACES}- USE SPACE TO RAIS
    E UMBRELLA"                   :rem 227
140 PRINT "-{2 SPACES}{A}******{X}
    {6 SPACES}OR FEND OFF SHARK"  :rem 66
150 PRINT "-{2 SPACES}{Z}******{S}
    {3 SPACES}USE < AND > TO MOVE FROM"
                                  :rem 231
160 PRINT "-{9 SPACES}-{9 SPACES}LEFT TO
    {SPACE}RIGHT"                 :rem 110
170 PRINT "-{2 SPACES}{A}*{R}****+*{S}
    {A}*{R}****{R}****{R}****{R}***{R}***
    {S}";                         :rem 4
180 PRINT "-{2 SPACES}- - {A}**{W} - - -
    {SPACE}{A}**{W}{4 SPACES}-{4 SPACES}-
     {O} -{3 SPACES}-";           :rem 198
190 PRINT "-{2 SPACES}- - {Z}**{W} {Z}*
    {X} - {Z}*{S}- {A}**{W} -- -{A}*{S}-
    {A}*{S}-";                    :rem 140
200 PRINT "-{2 SPACES}- {Q}**{S} - {A}*
    {S} - {A}*{X}- -{2 SPACES}- -- -- ---
     --";                         :rem 146
210 PRINT "-{2 SPACES}- {Q}**{X} - - - -
    {SPACE}{Z}**{W} -{2 SPACES}- -- -- --
    - --";                        :rem 20
220 PRINT "{Z}**{E}*{E}****{E}*{X} {Z}*
    {E}****{E}*{X}{2 SPACES}{Z}*{2 E}*{E}
    {X} {Z}{E}{X} {Z}{X}";        :rem 235
230 GETA$:IFA$=""THEN230          :rem 77
240 POKE53281,14:POKE53280,6      :rem 38
245 PRINT"{CLR}"CHR$(142)"{BLK}SCORE:
    {19 SPACES}FISHERMEN:"        :rem 77
250 PRINT"{2 DOWN}{WHT}{13 SPACES}{D}
    {RVS}{4 SPACES}{OFF}{F}"      :rem 154
260 PRINT"{12 SPACES}{C}{RVS}{9 SPACES}
    {OFF}{3 I}{F}{5 SPACES}{D}{RVS}
    {2 SPACES}{OFF}{F}"           :rem 117
270 PRINT"{4 SPACES}{D}{RVS}{4 SPACES}
    {OFF}{F}{3 SPACES}{C}{RVS}{13 SPACES}
    {OFF}{V}{2 SPACES}{D}{RVS}{7 SPACES}
    {OFF}{F}"                     :rem 158
280 PRINT"{2 SPACES}{D}{RVS}{7 SPACES}
    {OFF}{F}{5 SPACES}{C}{RVS}{8 SPACES}
    {OFF}{V}{3 SPACES}{C}{RVS}{7 SPACES}
    {OFF}{V}"                     :rem 178
290 PRINT" {C}{RVS}{12 SPACES}{OFF}{V}
    {4 SPACES}{C}{RVS}{4 SPACES}{OFF}{V}
```

```
    {7 SPACES}{C}{RVS}{3 SPACES}{OFF}{V}"
                                        :rem 198
300 PRINT"{5 SPACES}{C}{RVS}{7 SPACES}
    {OFF}{V}"                           :rem 130
310 PRINT"{7 SPACES}{C}{RVS}{3 I}{OFF}"
                                        :rem 171
311 PRINT"{5 DOWN}{22 SPACES}{RVS}£{OFF}
    {W}"                                :rem 187
312 PRINT"{21 SPACES}{RVS}£ {OFF}{W}"
                                        :rem 103
313 PRINT"{20 SPACES}{RVS}£{2 SPACES}
    {OFF}{W}"                           :rem 104
314 PRINT"{19 SPACES}{RVS}£{3 SPACES}
    {OFF}{W}"                           :rem 105
315 PRINT"{18 SPACES}{RVS}£{4 SPACES}
    {OFF}{W}"                           :rem 106
316 PRINT"{17 SPACES}{RVS}£{5 SPACES}
    {OFF}{W}"                           :rem 107
317 PRINT"{16 SPACES}{RVS}£{6 SPACES}
    {OFF}{W}"                           :rem 108
318 PRINT"{16 SPACES}{Z}{6 E}{W}":rem 243
319 PRINT"{14 SPACES}{2}{*}{RVS}
    {10 SPACES}{OFF}£"                  :rem 47
320 PRINT"{RVS}{BLU}{39 SPACES}{OFF}{BLK}
    ";                                  :rem 244
330 POKE2023,160:POKE2023+54272,6 :rem 16
340 SYS49152                            :rem 155
350 PRINT"{HOME}{BLK}{12 DOWN}{12 RIGHT}P
    RESS RETURN KEY"                    :rem 138
360 GETA$:IFA$<>CHR$(13)THEN360     :rem 4
370 S1=PEEK(829):S2=PEEK(830):S3=PEEK(831
    )                                   :rem 144
380 SC=INT(S1/16)*10+(S1AND15)+INT(S2/16)
    *1000+(S2AND15)*100                 :rem 234
390 SC=SC+INT(S3/16)*100000+(S3AND15)*100
    00                                  :rem 41
400 IF SC>HS THEN HS=SC                 :rem 47
410 GOTO10                              :rem 47
1000 DATA192,000,000,224,000,000,112,000
                                        :rem 167
1001 DATA000,056,000,000,028,000,000,014
                                        :rem 170
1002 DATA000,000,007,000,000,003,128,000
                                        :rem 166
1003 DATA001,128,000,000,000,000,000,000
                                        :rem 158
1004 DATA000,000,000,000,000,000,000,000
                                        :rem 147
1005 DATA000,000,000,000,000,000,000,000
                                        :rem 148
1006 DATA000,000,000,000,000,000,000,000
                                        :rem 149
1007 DATA000,000,000,000,000,000,000,000
                                        :rem 150
1008 DATA001,128,000,003,128,000,007,000
                                        :rem 184
1009 DATA000,014,000,000,028,000,000,056
                                        :rem 178
1010 DATA000,000,112,000,000,224,000,000
                                        :rem 156
1011 DATA192,000,000,000,000,000,000,000
                                        :rem 157
1012 DATA000,000,000,000,000,000,000,000
                                        :rem 146
1013 DATA000,000,000,000,000,000,000,000
                                        :rem 147
1014 DATA000,000,000,000,000,000,000,000
                                        :rem 148
1015 DATA000,000,000,000,000,000,000,053
                                        :rem 157
1016 DATA007,000,000,063,224,000,255,248
                                        :rem 200
1017 DATA000,002,000,000,002,000,000,002
                                        :rem 157
1018 DATA000,000,002,000,000,002,000,000
                                        :rem 156
1019 DATA002,000,000,018,000,000,012,000
                                        :rem 167
1020 DATA000,000,000,000,000,000,000,000
                                        :rem 145
1021 DATA000,000,000,000,000,000,000,000
                                        :rem 146
1022 DATA000,000,000,000,000,000,000,000
                                        :rem 147
1023 DATA000,000,000,000,000,000,000,000
                                        :rem 148
1024 DATA016,000,000,056,000,000,124,000
                                        :rem 174
1025 DATA000,254,000,000,158,000,000,206
                                        :rem 183
1026 DATA000,000,124,000,000,000,000,000
                                        :rem 158
1027 DATA000,000,000,000,000,000,000,000
                                        :rem 152
1028 DATA000,000,000,000,000,000,000,000
                                        :rem 153
1029 DATA000,000,000,000,000,000,000,000
                                        :rem 154
1030 DATA000,000,000,000,000,000,000,000
                                        :rem 146
1031 DATA000,000,000,000,000,000,000,000
                                        :rem 147
1032 DATA000,000,000,000,000,000,000,000
                                        :rem 148
1033 DATA000,000,000,000,000,000,000,000
                                        :rem 149
1034 DATA004,000,000,012,000,000,028,000
                                        :rem 167
1035 DATA000,060,001,007,255,195,014,127
                                        :rem 207
1036 DATA255,031,255,255,127,255,255,056
                                        :rem 237
1037 DATA127,255,003,255,195,000,000,001
                                        :rem 206
1038 DATA000,000,000,000,000,000,000,000
                                        :rem 154
1039 DATA000,000,000,000,000,000,000,183
                                        :rem 167
1040 DATA000,000,000,000,000,000,000,000
                                        :rem 147
1041 DATA000,000,000,000,000,000,000,000
                                        :rem 148
1042 DATA032,000,000,048,000,000,056,000
                                        :rem 177
1043 DATA128,060,000,195,255,224,255,254
                                        :rem 225
1044 DATA112,255,255,248,255,255,254,255
                                        :rem 240
1045 DATA254,028,195,255,192,128,000,000
                                        :rem 223
1046 DATA000,000,000,000,000,000,000,000
                                        :rem 153
1047 DATA000,000,000,000,000,000,000,183
                                        :rem 166
1048 DATA000,000,000,000,000,000,000,000
                                        :rem 155
1049 DATA000,000,255,000,000,255,000,003
                                        :rem 183
1050 DATA255,192,000,085,000,000,089,000
                                        :rem 202
1051 DATA000,085,064,000,090,000,000,085
                                        :rem 194
1052 DATA000,000,255,000,003,255,192,003
                                        :rem 192
```

```
1053 DATA245,080,003,255,192,003,255,192
                                    :rem 224
1054 DATA003,255,192,000,000,000,000,000
                                    :rem 179
1055 DATA000,000,000,000,000,000,000,000
                                    :rem 153
1056 DATA000,000,000,000,000,000,000,000
                                    :rem 154
1057 DATA000,000,255,000,000,255,000,003
                                    :rem 182
1058 DATA255,192,000,085,000,000,101,000
                                    :rem 195
1059 DATA001,085,000,000,165,000,000,085
                                    :rem 196
1060 DATA000,000,255,000,003,255,192,005
                                    :rem 193
1061 DATA095,192,003,255,192,003,255,192
                                    :rem 230
1062 DATA003,255,192,000,000,000,000,000
                                    :rem 178
1063 DATA000,000,000,000,000,000,000,000
                                    :rem 152
1064 DATA 256                       :rem 130
8000 PRINT"{N}{CLR}{12 DOWN}{RIGHT}LOADIN
     G SPRITES AND MACHINE LANGUAGE"
                                    :rem 87
8010 PRINT"{10 RIGHT}{4 DOWN}PLEASE BE PA
     TIENT..."                      :rem 96
9000 I=248*64                       :rem 129
9010 READ A:IF A=256 THEN 9100      :rem 4
9020 POKE I,A:I=I+1:CK=CK+A:GOTO 9010
                                    :rem 81
9100 IF CK<>19128 THEN PRINT"ERROR IN DAT
     A (LINES 1000-1064)":STOP      :rem 38
10000 I=49152:CK=0                  :rem 177
10010 READ A:IF A=256 THEN 10100    :rem 84
10020 POKE I,A:I=I+1:CK=CK+A:GOTO 10010
                                    :rem 161
10100 IF CK<>139243 THEN PRINT"ERROR IN D
      ATA (LINES 49152-50346)":STOP
                                    :rem 250
10200 RETURN                        :rem 211
49152 DATA 169,3,141,64,3,169       :rem 161
49158 DATA 7,141,21,208,169,217     :rem 5
49164 DATA 141,1,208,169,1,141      :rem 198
49170 DATA 28,208,169,10,141,37     :rem 0
49176 DATA 208,169,7,141,38,208     :rem 13
49182 DATA 169,0,141,39,208,32      :rem 207
49188 DATA 60,193,169,25,141,60     :rem 10
49194 DATA 3,169,250,141,250,7      :rem 207
49200 DATA 169,209,141,5,208,169    :rem 53
49206 DATA 2,141,41,208,169,44      :rem 202
49212 DATA 32,238,193,32,156,195    :rem 55
49218 DATA 169,0,141,61,3,141       :rem 148
49224 DATA 62,3,141,63,3,32         :rem 45
49230 DATA 174,195,32,141,196,169:rem 110
49236 DATA 32,141,71,3,169,0        :rem 100
49242 DATA 141,72,3,173,60,3        :rem 97
49248 DATA 141,67,3,32,4,196        :rem 112
49254 DATA 32,238,193,206,67,3      :rem 213
49260 DATA 208,245,141,4,212,32     :rem 244
49266 DATA 150,192,173,64,3,201     :rem 254
49272 DATA 0,208,226,169,0,133      :rem 201
49278 DATA 198,169,0,141,21,208     :rem 9
49284 DATA 169,0,141,4,212,169      :rem 208
49290 DATA 0,162,0,157,0,208        :rem 94
49296 DATA 232,224,17,208,248,96    :rem 66
49302 DATA 173,30,208,141,69,3      :rem 200
49308 DATA 173,65,3,201,1,240       :rem 145
49314 DATA 87,173,66,3,201,0        :rem 103
49320 DATA 240,46,173,69,3,41       :rem 154
49326 DATA 6,201,6,208,11,169       :rem 153
49332 DATA 117,32,31,195,32,179     :rem 2
49338 DATA 194,76,46,193,173,2      :rem 224
49344 DATA 208,201,225,208,3,76     :rem 254
49350 DATA 37,193,206,2,208,173     :rem 1
49356 DATA 2,208,201,255,208,5      :rem 203
49362 DATA 169,0,141,16,208,96      :rem 212
49368 DATA 173,2,208,201,115,144    :rem 46
49374 DATA 3,76,37,193,173,69       :rem 178
49380 DATA 3,41,6,201,6,208         :rem 47
49386 DATA 11,169,117,32,31,195     :rem 7
49392 DATA 32,179,194,76,46,193     :rem 25
49398 DATA 238,2,208,96,173,3       :rem 173
49404 DATA 208,201,227,144,3,76     :rem 252
49410 DATA 37,193,173,69,3,41       :rem 161
49416 DATA 6,201,6,208,11,169       :rem 153
49422 DATA 80,32,31,195,32,202      :rem 196
49428 DATA 194,76,46,193,173,69     :rem 29
49434 DATA 3,41,3,201,3,240         :rem 37
49440 DATA 4,238,3,208,96,32        :rem 109
49446 DATA 151,194,206,64,3,32      :rem 208
49452 DATA 156,195,162,30,32,106    :rem 49
49458 DATA 195,202,208,250,165,162
                                    :rem 157
49464 DATA 201,192,144,38,169,0     :rem 4
49470 DATA 141,2,208,169,229,141    :rem 51
49476 DATA 3,208,169,253,141,249    :rem 64
49482 DATA 7,169,0,141,40,208       :rem 156
49488 DATA 141,16,208,141,65,3      :rem 210
49494 DATA 141,66,3,169,0,141       :rem 159
49500 DATA 27,208,173,30,208,96     :rem 2
49506 DATA 201,128,144,44,169,80    :rem 53
49512 DATA 141,2,208,169,229,141    :rem 48
49518 DATA 3,208,169,252,141,249    :rem 60
49524 DATA 7,169,0,141,40,208       :rem 153
49530 DATA 169,2,141,16,208,169     :rem 4
49536 DATA 0,141,65,3,169,1         :rem 54
49542 DATA 141,66,3,169,0,141       :rem 153
49548 DATA 27,208,173,30,208,96     :rem 14
49554 DATA 201,64,144,44,169,139    :rem 60
49560 DATA 141,2,208,169,100,141    :rem 39
49566 DATA 3,208,169,251,141,249    :rem 62
49572 DATA 7,169,6,141,40,208       :rem 162
49578 DATA 169,0,141,16,208,169     :rem 14
49584 DATA 1,141,65,3,169,0         :rem 57
49590 DATA 141,66,3,169,2,141       :rem 158
49596 DATA 27,208,173,30,208,96     :rem 17
49602 DATA 169,218,141,2,208,169    :rem 56
49608 DATA 100,141,3,208,169,251    :rem 45
49614 DATA 141,249,7,169,6,141      :rem 214
49620 DATA 40,208,169,0,141,16      :rem 198
49626 DATA 208,169,1,141,65,3       :rem 160
49632 DATA 169,1,141,66,3,169       :rem 164
49638 DATA 2,141,27,208,173,30      :rem 205
49644 DATA 208,96,201,44,208,17     :rem 7
49650 DATA 169,132,141,0,208,169    :rem 52
49656 DATA 255,141,248,7,32,227     :rem 11
49662 DATA 194,32,112,195,96,201    :rem 57
49668 DATA 46,208,17,169,212,141    :rem 62
49674 DATA 0,208,169,254,141,248    :rem 61
49680 DATA 7,32,227,194,32,112      :rem 207
49686 DATA 195,96,201,32,208,113    :rem 60
49692 DATA 173,68,3,201,0,208       :rem 157
49698 DATA 115,173,70,3,201,0       :rem 153
49704 DATA 208,108,173,65,3,201     :rem 253
49710 DATA 0,240,38,169,2,141       :rem 148
49716 DATA 41,208,169,209,141,5     :rem 6
49722 DATA 208,169,250,141,250,7    :rem 51
49728 DATA 173,0,208,201,132,208    :rem 44
49734 DATA 8,169,138,141,4,208      :rem 217
49740 DATA 76,132,194,169,218,141:rem 112
```

```
49746 DATA 4,208,76,132,194,169   :rem 19
49752 DATA 0,141,41,208,173,0     :rem 145
49758 DATA 208,201,132,208,18,169:rem 109
49764 DATA 127,141,4,208,169,230  :rem 55
49770 DATA 141,5,208,169,249,141  :rem 59
49776 DATA 250,7,76,132,194,169   :rem 22
49782 DATA 232,141,4,208,169,230  :rem 52
49788 DATA 141,5,208,169,248,141  :rem 67
49794 DATA 250,7,32,1,195,169     :rem 170
49800 DATA 200,141,68,3,96,201    :rem 198
49806 DATA 95,208,5,169,0,141     :rem 164
49812 DATA 64,3,96,32,141,196     :rem 165
49818 DATA 169,33,141,4,212,162     :rem 2
49824 DATA 255,142,1,212,142,37   :rem 251
49830 DATA 208,32,106,195,202,208 :rem 97
49836 DATA 244,169,10,141,37,208  :rem 57
49842 DATA 96,32,141,196,169,129  :rem 71
49848 DATA 141,4,212,162,255,142  :rem 50
49854 DATA 1,212,142,40,208,32    :rem 196
49860 DATA 106,195,202,208,244,96:rem 110
49866 DATA 32,141,196,169,129,141:rem 116
49872 DATA 4,212,162,0,142,1      :rem 94
49878 DATA 212,142,40,208,32,106  :rem 48
49884 DATA 195,232,224,50,208,242:rem 108
49890 DATA 96,169,33,141,4,212    :rem 216
49896 DATA 162,15,142,1,212,32    :rem 203
49902 DATA 106,195,32,106,195,202 :rem 99
49908 DATA 224,5,208,242,169,0    :rem 211
49914 DATA 141,4,212,32,106,195   :rem 251
49920 DATA 96,169,33,141,4,212    :rem 210
49926 DATA 162,5,142,1,212,32     :rem 148
49932 DATA 106,195,32,106,195,232:rem 105
49938 DATA 224,20,208,242,169,0     :rem 3
49944 DATA 141,4,212,32,106,195   :rem 254
49950 DATA 96,248,24,109,61,3     :rem 168
49956 DATA 141,61,3,169,0,109     :rem 161
49962 DATA 62,3,141,62,3,169      :rem 112
49968 DATA 0,109,63,3,141,63      :rem 111
49974 DATA 3,216,32,174,195,56    :rem 222
49980 DATA 173,62,3,237,71,3      :rem 113
49986 DATA 141,69,3,173,63,3      :rem 121
49992 DATA 237,72,3,13,69,3       :rem 69
49998 DATA 144,25,169,32,248,24   :rem 22
50004 DATA 109,71,3,141,71,3      :rem 85
50010 DATA 169,0,109,72,3,141     :rem 136
50016 DATA 72,3,216,238,64,3      :rem 97
50022 DATA 32,156,195,96,160,0    :rem 197
50028 DATA 200,208,253,96,169,0   :rem 250
50034 DATA 141,41,208,173,0,208   :rem 236
50040 DATA 201,132,208,16,169,248 :rem 87
50046 DATA 141,250,7,169,127,141  :rem 41
50052 DATA 4,208,169,222,141,5    :rem 193
50058 DATA 208,96,169,249,141,250:rem 109
50064 DATA 7,169,232,141,4,208    :rem 199
50070 DATA 169,222,141,5,208,96   :rem 252
50076 DATA 162,0,160,35,24,32     :rem 139
50082 DATA 240,255,173,64,3,24    :rem 197
50088 DATA 105,48,32,210,255,96     :rem 0
50094 DATA 162,0,160,6,32,240     :rem 137
50100 DATA 255,173,63,3,41,240    :rem 186
50106 DATA 74,74,74,74,24,105     :rem 154
50112 DATA 48,32,210,255,173,63   :rem 243
50118 DATA 3,41,15,24,105,48      :rem 91
50124 DATA 32,210,255,173,62,3    :rem 188
50130 DATA 41,240,74,74,74,74     :rem 150
50136 DATA 24,105,48,32,210,255   :rem 241
50142 DATA 173,62,3,41,15,24      :rem 89
50148 DATA 105,48,32,210,255,173  :rem 41
50154 DATA 61,3,41,240,74,74      :rem 96
50160 DATA 74,74,24,105,48,32     :rem 149
50166 DATA 210,255,173,61,3,41    :rem 193
50172 DATA 15,24,105,48,32,210    :rem 187
50178 DATA 255,96,32,16,196,72    :rem 219
50184 DATA 32,71,196,32,125,196     :rem 2
50190 DATA 104,96,32,228,255,201  :rem 41
50196 DATA 0,208,3,76,70,196      :rem 108
50202 DATA 201,133,208,7,169,25   :rem 241
50208 DATA 141,60,3,169,133,201   :rem 238
50214 DATA 134,208,7,169,18,141   :rem 250
50220 DATA 60,3,169,134,201,135   :rem 236
50226 DATA 208,7,169,13,141,60    :rem 198
50232 DATA 3,169,135,201,136,208  :rem 37
50238 DATA 7,169,9,141,60,3       :rem 55
50244 DATA 169,136,96,173,68,3    :rem 218
50250 DATA 240,5,206,68,3,240     :rem 140
50256 DATA 21,173,70,3,201,0      :rem 83
50262 DATA 240,3,206,70,3,162     :rem 137
50268 DATA 90,202,208,253,169,0   :rem 252
50274 DATA 141,4,212,96,173,4     :rem 149
50280 DATA 208,201,0,240,5,169    :rem 189
50286 DATA 0,141,4,208,32,112     :rem 136
50292 DATA 195,169,255,141,70,3     :rem 3
50298 DATA 76,81,196,173,141,2    :rem 215
50304 DATA 41,1,201,1,208,6       :rem 28
50310 DATA 32,16,196,76,125,196     :rem 0
50316 DATA 96,162,0,169,0,157     :rem 154
50322 DATA 0,212,232,224,25,208   :rem 231
50328 DATA 248,169,15,141,24,212  :rem 45
50334 DATA 169,16,141,5,212,169   :rem 252
50340 DATA 240,141,6,212,169,100  :rem 26
50346 DATA 141,0,212,96,256       :rem 51
```


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Bug-Swatter:
Modifications And Corrections

• Reader Clifford Tener has discovered a minor error in "Poker" (March). The VIC and 64 versions see an ace as a high card, which eliminates the possibility of small straights (A-2-3-4-5). To correct this, make the following changes:

```
2110 YY=0:IFPT(4)-PT(3)=1THENIFPT(3)-PT(2
     )=1THENIFPT(2)-PT(1)=1THENYY=1

2115 IFYY=1THENIF(PT(5)-PT(4)=1)OR(PT(1)+
     PT(5)-15=1)THENSS=1
```

• Program 4 of "How To Use Arrays" (February) contains misplaced characters in 5180 and 5270. In each of these lines, replace the first double quote with a number sign (#):

```
5180 INPUT#4,HW(N)
5270 PRINT#1,"NAME","SCORE"
```

• Program 4 of "Making Calendars" (April) crashes when printing calendars for the years following 2200 A.D. Readers who like to plan 200 years in advance should make the following change to line 1247:

```
1247 IF(Y=2200ANDM0>3)OR(Y>2200)THEND1=D1
     -1:IFD1=0THEND1=7
```

• The Commodore 64 version of "React" (February) runs as listed, but does not correctly read the forward diagonals of the joystick. To fix it, change line 640. JS(5) should be –41 and JS(9) should be –39. Thanks to Paul T. Dawson for discovering this error.

• Reader Scott Campbell finds it more convenient to use the space bar rather than the M key to represent zero in "Numeric Keypad" (April). Pressing M with a thumb is rather awkward. To make the switch, change the 77 in line 520 to 32 (64 version).

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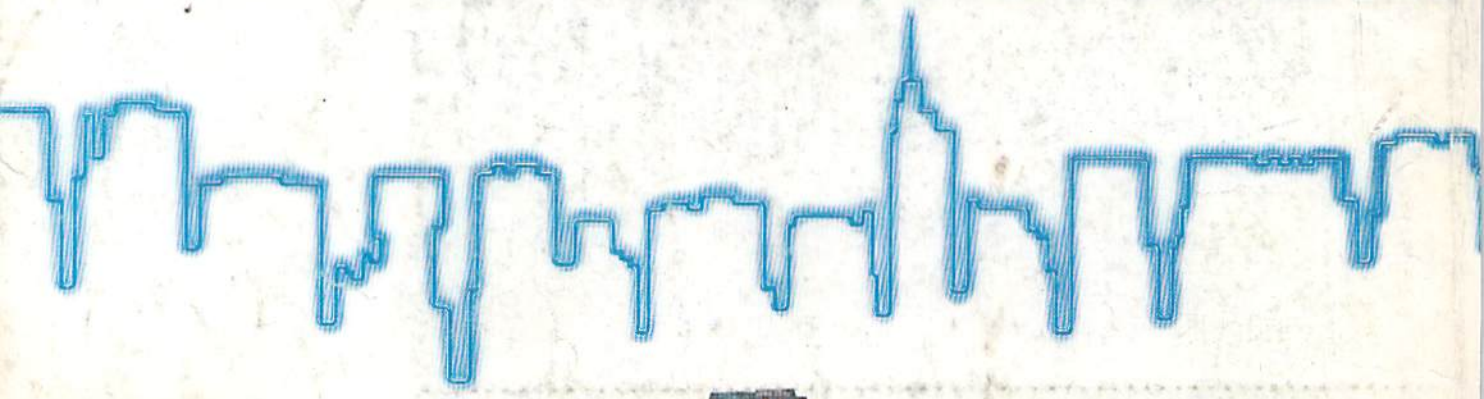

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